UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

FEB 24 2020

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
Article Number: 7019 1120 0002 0279 0874

Heath Wanamaker
Operations Manager/Acting Refinery Manager
Phillips 66 Company
1400 Park Avenue - P.O. Box 450
Linden, NJ 07036

Re: Phillips 66 Co., Bayway Refinery, Linden NJ
EPA/NJDEP NJPDES Permit Compliance Evaluation Inspection June 12, 13, and 20, 2019
NJPDES Permit No. NJ0001511 (NJPID No. 46318), NJ0026671 (NJPID No. 46322)

Dear Mr. Wanamaker:

Representatives from the United States Environmental Protection Agency ("EPA") Region 2 and the New Jersey Department of Environmental Protection ("NJDEP") conducted a Compliance Evaluation Inspection ("CEI") at the subject Facility on June 12, 13 and 20, 2019. The purpose of the CEI was to evaluate compliance with your New Jersey Pollutant Discharge Elimination System ("NJPDES") Permits ("Permit") No. NJ0001511 and NJ0026671. NJDEP has already transmitted the NJDEP inspection reports for these two inspections on January 3, 2020 and has also followed up with Notices of Violation for some of the Findings identified during this inspection. There is overlap between the Findings listed in the EPA inspection report and the NJDEP inspection reports. For those Potential Non-Compliance items and Areas of Concern where the Facility has already responded to NJDEP, you do not need to rewrite a response, just include your submittal(s) to NJDEP along with a note that identifies the paragraph of the EPA inspection report that it pertains to.

Within forty-five (45) calendar days of receipt of this letter please submit, a written response to the CEI Report with the actions (including a schedule) that are being taken or will be taken to address each of the Potential Non-Compliance Items or Areas of Concern (items that should be improved or addressed for better operations of the facility), to EPA and NJDEP (See Addresses Below).

Justine Modigliani, P.E., Chief, CWA Compliance Section
Enforcement and Compliance Assurance Division
U.S. Environmental Protection Agency, Region 2
290 Broadway, 21st Floor
New York, New York 10007

Richard T. Paull, Director
NJDEP Division of Water and Land Use Enforcement
Mail Code 401-04B
401 East State Street - PO Box 420
Trenton, NJ 08625-0420

Should you have any questions regarding this letter, feel free to contact me at (212) 637-4268 or contact Mr. Murray Lantner, P.E. of my staff at (212) 637-3976 (Lantner.Murray@epa.gov).

Sincerely,

Justine Modigliani, P.E., Chief
CWA Compliance Section

Enclosure – Inspection Report from June 2019 CEI

cc: Richard T. Paull, Director, Division of Water and Land Use Enforcement
Andrew Coleman, NJDEP Central Division via email
George Bakun, P.E. Env. Eng. Phillips 66 via email
Meghan Nolan, Environmental Team Lead Phillips 66 via email
Hope Gray, HSE Mgr., Phillips 66 via email

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2, ECAD-WCB
290 Broadway, 20th Floor, New York, NY 10007

Program: Traditional NPDES	**Inspection Type:** Compliance Evaluation Inspection
Permittee Name: Phillips 66 Co. Bayway Refinery	**NPDES/ICIS No.:** NJ0001511, NJ0026671
Inspection Entry Date: June 12, 2019 **Inspection Entry Time:** 9:30 AM	**Inspection Exit Date:** June 20, 2019 **Inspection Exit Time:** 5:00 PM
Facility Information: Phillips 66 Co. Bayway Refinery, 1400 Park Avenue, Linden, NJ 07036	**Lat, Long:** 40.6365 -74.219171° **NAICS / SIC Code:** 324110 /2911 petroleum refining and others.
NJ PID No. 46318 (NJ0001511), 46322 (NJ0026671)	
EPA Representative(s): Murray Lantner, P.E. Environmental Engineer, EPA Region 2, DECA-WCB. (212) 637-3976	
State Representative(s): Andrew Coleman, Environmental Specialist III, NJDEP Central Bureau of Water Compliance & Enforcement, Mail Code 44-03, P.O. Box 420 Trenton NJ 08625 Andrew.Coleman@dep.nj.gov (609) 439-6422	
On-Site Facility Representative George Bakun, P.E. Environmental Engineer, Phillips 66 Company, 1400 Park Ave. Linden, NJ 07036, 1400 Park Ave. Linden, MJ 07036, Bakun, George: George.Bakun@p66.com Meghan Nolan, Environmental Team Lead, Meghan.E.Nolan@p66.com, (908) 523-5138 Hope Gray, HSE Mgr., Bayway Refinery, Hope.Gray@p66.com, (908) 523-6304	
Responsible Official: Heath Wanamaker Operations Manager/ Acting Refinery Manager, Phillips 66 Company, 1400 Park Avenue, P.O. Box 450 Linden, NJ 07036	

Name and Signature of Inspector	Agency/Office/Phone Number	Date
Murray Lantner, P.E. Env. Eng.	ECAD-WCB (212) 637-3976	2/7/20
Name and Signature of Management QA Reviewer	**Agency/Office/Phone Number**	**Date**
Justine Modigliani, P.E. Env. Eng.	ECAD-WCB (212) 637-4268	2/21/20

I. INTRODUCTION

On June 12, 13 and 20, 2019, representatives of the United States Environmental Protection Agency ("EPA") Region 2 and the New Jersey Department of Environmental Protection

("NJDEP") conducted a joint Compliance Evaluation Inspection ("CEI" or "Inspection") at the Phillips 66 Bayway Refinery (the "Site" or "Facility"). The objective of this Joint Inspection was to evaluate the compliance status with the Facility's New Jersey Pollutant Discharge Elimination System ("NJPDES") Permit NJ0001511 (Refinery Discharges) and to also inspect outfalls under the Facility's Individual Stormwater Permit NJ0026671.

A description of the Facility is contained in the Fact Sheet in Attachment 2. The facility reported that they process 300,000 barrels of oil each day.

A diagram of the process wastewater and stormwater flow under NJ0001511 is included in Attachment 3.

Oil was said to come in by rail car or boat. Refined fuel is sent out by boat, truck or pipeline. The Facility has approximately 500 employees and 200 contractors.

Upon entering the site, the EPA inspector Murray Lantner presented his credentials to George Bakun, Environmental Engineer at the Facility and the appropriate Facility badge was obtained. The EPA and NJDEP representative held an opening conference and explained the scope of the inspection. During the opening conference, Facility representatives gave an overview of the operations at the Facility. Following the opening conference, the EPA and NJDEP representatives, along with the site representatives, conducted an inspection of the Facility, which included visiting all outfalls under Permit No. NJ001511, the Wastewater Treatment Plant, a cursory review of the on-site laboratory, as well as the outfalls listed in this inspection report for the individual Stormwater Permit NJ0026671.

II. FINDINGS & OBSERVATIONS – NJ0001511 – Process and Cooling Water Permit (Outfalls 001 to 005)

A. Outfall Observations (Including Areas of Concern (AOCs) and Potential Non Compliance (PNC))

Line No.	Outfall	Photos	Comments	AOC or PNC
1	003	Att. 1a 757, 758	Outfall 003 – no sheen at discharge. The 003 separator was said to be inspected 3 times per shift, and 6 times per day. Some oil was seen in the first part of the separator, but oil was not seen discharging. The Facility representatives also said that during warm weather oil can be seen popping up from creek sediments near Outfall 003.	
2	001	Att. 1c 887-893	Outfall 001 (at Dam No. 1) had a sheen upstream of the underflow baffle and booms, there was not a sheen or foam seen in the effluent. The Facility representative said that oil bubbles out of the sediment upstream of Outfall 001 (Dam No. 1). As shown photo 889 (Att. 1.c) the Oil and grease sample at Outfall 001 is taken with a glass sample jar that is placed inside a metal basket and lowered with a rope into the effluent. The Oil and Grease is sampled from the glass jar inside the metal basket and the sample is then transferred to the glass sample jar that is sent to the laboratory. Oil and grease under 40 CFR Part 136/EPA Method 1664 must be sampled directly into the glass sample jar and not transferred. (AOC) pH measurement using continuous pH meter at the outfall read 7.24 S.U and the temperature was 85.9 deg. F (29.9 Deg. C). Continuous pH monitoring was tied into computer system but was said not to be used for NPDES Monitoring. (The Permit does specify grab sampling for pH). Grab samples for pH are collected on Wed. afternoons.	AOC – Oil and Grease Monitoring

			The Composite sampling refrigerator was at 4.8 deg. C (<6 deg C in accordance with 40 CFR 136.3 Table II). Teflon tubing (required for semi- volatiles and other composited organics) was being used at the composite samplers.	
3	005	Att. 1.c. 894 to 923	The following entry is related to Outfall 005 and the Polypropylene manufacturing area. a. Polypropylene ("PP") pellets were being vacuumed up with a vacuum truck near Outfall 005 in a boomed area. (Photos 894-899 Att. 1.c). This outfall receives flow from the separator in the Polypropylene area. The separator in the PP area receives, rail car washout (including left over PP pellets (heels), Pellet cooling water, resin spills (powder). b. In the Polypropylene area there were PP pellets on the ground near the PP separator (Photos 901-903, Att. 1.c). c. The PP Pellet separator in the PP area was discharging floating pellets to Outfall 005. As shown in photos 904 and 905 (Att. 1.c) a screen that was meant to be installed over the effluent line was not in place,and was hanging on the wall near the effluent pipe. The Polypropylene Plant Pellet Separator is only authorized to discharge Clean Water per Part IV.G.5.a of the Permit. The discharge from the separator was not clean and it contained PP pellets. Facility representatives said they did not want pellets going into to the Process Sewer tributary to the WWTP and preferred to keep the pellet separator discharge separate from the other process wastewater. However, at the time of the inspection the existing separator was allowing pellets to pass through and discharge the pellets.	PNC – A. Polypropylene in boomed area and on ground and in the water around Outfall 005. B. PP Pellets were seen discharging from the separator. Improvements are needed to prevent PP pellet discharge. C. PP Pellets are blown out of baghouse dumpster and were seen accumulated in parts of the PP area.

			d. As shown in photos 913 and 914 (Att. 1.c) there was an open dumpster receiving solids from the PP baghouse with waste polypropylene that could be blown out of the dumpster. Photos 916 to 923 show PP pellets on the ground in the area near the dumpsters and near an air intake system near the waste dumpsters. The Facility representative explained that these dumpsters, which collects material off of the PP baghouse, are kept open because the material inside the dumpster needs to be raked periodically. This dumpster should have a cover/or be within a contained area so that the waste Polypropylene pellets can-not be blown out of the dumpster or dumpster area. e. As shown in photo 918 (Att. 1.c) there was an open tote with waste material in it, waste containers should be kept covered to avoid stormwater contamination.	
4	004	929 to 932 Att. 1.c	As shown in photos 629 to 632 there was scum seen floating inside the booms at the Poly Ditch Outfall 004. The Scum was thought to be associated with the Clam-Trol application that was conducted earlier in the day. The Facility representative said that a Vac truck would be brought in next shift to remove the floating scum at Outfall 004. NJDEP, in its subsequent inspection report, required that Best Management Practices be developed for the collection and removal of material at Outfall 004 during and after Clam-Trol application.	AOC
5	002	Att.1b 807	Seen entries below for the Wastewater Treatment Plant Outfall 002– The discharge from Outfall 002 was clear and free of foams/sheens.	

B. AREAS OF CONCERN (NJ0001511)

Wastewater Treatment Plant (Outfall 002) Findings/Areas of Concern

1. During the inspection there were API separators out of service for cleaning/sludge removal. Typically, it will take 2 to 3 weeks to remove sludge from the separators. The Facility had dewatering equipment setup for dewatering the API Separator sludge and was sending the associated wastewater back into the process sewer (See Photo 774, Att. 1.b). Please provide the current operational status of each of the API separators.

2. As shown in photos 775 and 776 (Att. 1b), there was oily water in the tank 133 dike area. Facility representatives thought that the process sewer could back up into the tank dike and that the process sewer needed to be cleaned. As shown in photos 778 and 779 (Att. 1b), there was a break in the valve for the tank 132 and 133 dikes. Provide the status of the tanks 132 and 133 dike valve and the status of flow in the process sewer. Additionally, clean up/removal of oil in the tank dike was needed. Facility representatives said that the tank dike would be cleaned.

3. There are two Aerated Lagoons (Biological Oxidation) or Bi-Ox Lagoons that are operated in parallel.

   a. As shown in photos 782 and 783 in Attachment 1.b there is an array of temporary piping setup for returning Return Activated Sludge ("RAS") to different points near the influent end of the Bi-Ox lagoons. The temporary piping was returning flow from dead zones in the Bi-Ox lagoons.

   b. As shown in photo 791 – there was an eroded section of the lagoon dike, at the effluent end of the lagoon, due to a pipe break; The dike must be stabilized and permanent/structurally sound piping should be installed for the RAS and other lines used to operate the Bi-Ox Lagoons. Describe any plans/schedules for installing and using permanent RAS lines.

   c. As shown in photos 784, 785, 786 (Att.1b) there was foam buildup on the Bi-Ox Lagoons. There was a buildup of floating solids as well as shown in photo 787 (Att. 1.b).

   d. As shown in photo 790 (Att. 1b) RAS diesel pumps were set up and running. Three new electric RAS pumps had been installed, but were not yet operational. Explain the status and schedule for getting the electric RAS pumps operating.

   e. During the inspection the Dissolved Oxygen (D.O.) Meter on the East Bi-Ox Lagoon read 0.0. The Facility representative believed that this was due to a faulty D.O. probe.

   f. The facility representative indicated that they were considering replacing the surface aerators with a different type and different spacing to avoid dead zones in the Bi-Ox Lagoons. Please explain the status of the aerator upgrades.

4. There are 3 final clarifiers at the facility:

   a. As shown in photograph No.797 Att. 1.b. there is a missing weir plate in Clarifier No. 1. Weir plates in the clarifiers must be replaced to avoid short circuiting of the clarifier.

   b. As shown in photos 798 and 799, clarifier No. 3 is down for maintenance. The facility representative explained that it was down since early 2019, (approximately 3 to 4 months). Facility representatives stated that all 3 clarifiers will be back in service for hurricane season. Explain the current operational status of the clarifiers

5. There are 6 final filters at the WWTP, housed in the filter building:

   a. During the inspection, 2 of the 6 filters were down. The facility representatives said that they could run the plant with 4 filters. Facility representatives explained that the design capacity of the plant is limited to 15 MGD due to limitations at the filters. The plant was said to be designed for the 25 year 24 hour storm (~6" rain). Occasionally the filters are bypassed for maintenance and the facility explained that additional TSS monitoring is conducted during filter bypass events. Explain the current operational status of the 6 filters.

   b. As shown in photos 800 to 804 (Att.1b) there is a broken water line ((said to be operated by American Water) inside the filter building. Water is seen puddling and flowing outside of the filter building.

   c. As shown in photos 805 and 806 (Att. 1.b) there are gate valves associated with the filters that are leaking. The facility representative indicated that they were planning on replacing the gate valves with butterfly valves to eliminate leakage. Please provide the status of the gate valve replacement.

6. As shown in photos 810 to 812 (Att. 1b) there are unstabilized soils adjacent to the Creek (around an elevated pipeline in the vicinity of the WWTP effluent – Outfall 002). Unstabilized soils could be washed into the adjacent creek and also eroded when there are high creek levels.

7. **Salt Water Intake Pump House (Arthur Kill)**

a. On June 20, 2019, there was foaming seen in the Railroad Ave. Ditch. The facility representative said that foaming occurs when the biocide, Clam-Trol is applied to the Arthur Kill intake water. As shown in photo 878 (Att. 1.c) there was foaming at the Salt Water Pump Station intake on the plant side of the influent screen where Clam-Trol was being applied. The travelling screens are shut off when Clam-Trol is applied and foaming was not seen in the Arthur Kill at this location. Clam-Trol was said to be applied approximately four times per year. NJDEP, in its subsequent inspection report, required that Best Management Practices be developed for the collection and removal of material at Outfall 004 during and after Clam-Trol application.

b. Influent composite (Total Suspended Solids and Total Organic Carbon) and grab (Oil and Grease) samples are collected at the influent pump house. The Oil and Grease grab sample is collected in a glass container and then transferred to a glass jar which is inconsistent with EPA Method 1664 and 40 CFR Part 136. The approved method requires that oil and grease samples collected directly into the glass sampling container. This requirement was established because oil can adhere to the sample container surfaces. However, because this is an intake sample used for Net limits, any oil and grease loss due to adhesion to sampling containers would serve to bias the intake sample low, which could serve to increase the net oil and grease concentration in the effluent.

c. As shown in photo 877 in Attachment 1.b. impinged shellfish were collected in a crate/screen adjacent to the Arthur Kill (Salt Water) pump house screens. The facility does not have a system for returning marine life collected off of the intake screens to the Arthur Kill. Nor does it have a Ristroph type system for removing marine life off of the intake screens.

Part IV.G.1 of the Permit (NJ0001511) which became effective on October 1, 2013, and expired on September 30, 2018, required an Impingement Alternatives Analysis ("IAA") to be conducted within 15 months of the Effective Date of the Permit. An IAA dated December 2014 was transmitted to NJDEP on or about December 24, 2014. The IAA made recommendations and conclusions for technology to be installed to reduce impingement mortality (See select pages and conclusions Att. 4).

Part IV.G.1.d. of the Permit stated that, upon receipt of the IAA, NJDEP would evaluate the findings in concert with final EPA regulations and will reopen the permit to incorporate permit conditions. A minor modification to the Permit was completed and became effective in October 2016. The minor modification of the Permit did not address the impingement/entrainment required by Section 316(b) of the CWA or EPA's regulations (published in the federal register August 15, 2014) nor the recommendations and conclusions of the IAA. The Facility Representative said that the Section 316(b) requirements would be addressed in a Permit Renewal.

d. Part E.1.a of the Permit (NJ0001511) approves select corrosion inhibitors, biocides or other cooling water and cooling tower additives as well as similar chemical compounds due to changes in vendors or names. Clam Trol is an approved cooling water additive, please verify that BPC 68940 (Photo 881 Att. 1c) which was on site at the Salt Water Pump Station, is similar to Clam-Trol or other approved biocide.

e. As shown in photo 883 (Att. 1.c) there was debris in an open container outside of the Salt Water Pump Station that needs to be disposed of properly.

8. **Process Sewer Overflows**

a. As shown in photo 927 and 928 (Att. 1.c) there is an overflow from the ISO Unit that flows onto the ground. The facility representatives said that this wastewater flow enters the process sewer. Nonetheless, the permit requires proper Operation and Maintenance of the sewer system and this wastewater must remain in the sewer and

process wastewater discharges to the sewer must be controlled to avoid sewer overflows.

b. As shown in photos 934 to 938 there is a diesel pump set up on the Infineum Process Sewer to control/minimize process sewer overflows. The sewer was said to have a gas seal at this this location (a change in elevation of the sewer to prevent any gases in the sewer from traveling to the next sewer segment).

The permit requires proper Operation and Maintenance of the sewer system. Sewers must be maintained to ensure that they are flowing properly and process wastewater discharges to the sewer must be controlled to avoid sewer overflows. In both instances the overflows were said to be returned to the process sewer.

c. As shown in photo 936 (Att. 1.c) there was flow entering the area near the diesel pump shown in photo 934. Please verify the source of this flow.

9. Part IV.A.1.b of the Permit requires that wastewater analysis be conducted in accordance with 40 CFR Part 136 unless other test procedures have been approved by NJDEP in writing or as otherwise specified in the Permit. Review of the discharge monitoring report ("DMR") and laboratory records for August 2018 and the July 2018 Wastewater Characterization Samples (Outfalls 003, 004, 005) identified the following:

a. The Semi-Annual Wastewater Characterization Report samples for Outfalls 003, 004, and 005 identified that hexavalent chromium monitoring was conducted in July 2018 by Test America, Edison NJ, using EPA Method SW-846 Method 7196A. The same method was used for Outfall 002 hexavalent chromium in August 2018. Based upon the table below from 40 CFR Part 136.3, the lab did not use the 40 CFR Part 136 approved method. Please identify whether a separate NJDEP, EPA or other approval to use SW-846 Method 7196A has been authorized. Note that SW846 Method 7196A is based on the same technology (Colorimetric; Diphenyl-carbazide) as NPDES Approved Method SM 3500-Cr B or D and the Facility can explore with the lab whether they can also certify and document on the lab reports that they meet the approved method SM 3500-Cr B or D.

Method Summary

Client: Phillips 66
Project/Site: Bayway Refinery, Linden, NJ

TestAmerica Job ID: 460-162444-1

Method	Method Description	Protocol	Laboratory
200.8	Metals (ICP/MS)	EPA	TAL EDI
7196A	Chromium, Hexavalent	SW846	TAL EDI
200.8	Preparation, Total Recoverable Metals	EPA	TAL EDI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates

Laboratory References:

TAL EDI = TestAmerica Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

11

HEXAVALENT CHROMIUM

Sample DSN 002A Composite (3TE) (460-162444-1) was analyzed for hexavalent chromium in accordance with EPA SW-846 Method 7196A. The samples were analyzed on 08/13/2018.

No difficulties were encountered during the hexchrome Cr6 analysis

All quality control parameters were within the acceptance limits

			2011		
18. Chromium VI dissolved, mg/L	0.45-micron filtration followed by any of the following:				
	AA chelation-extraction		3111 C-2011		I-1232-85.[2]
	Ion Chromatography	218.6, Rev. 3.3 (1994)	3500-Cr C-2011	D5257-11	993.23.[3]
	Colorimetric (diphenyl-carbazide)		3500-Cr B-2011	D1687-12 (A)	I-1230-85.[2]

b. As shown in the excerpt below form the August 2018 lab report for mercury at Outfalls 003, 004, and 005, EPA Method SW-846 Method 7470A was used for mercury analysis. EPA Method SW-846 Method 7470A is not a 40 CFR Part 136 method approved for mercury analysis in wastewater.

Case Narrative

Client: Phillips 66
Project/Site: Bayway Refinery, Linden, NJ

TestAmerica Job ID: 460-161780-1

Job ID: 460-161780-1 (Continued)

Laboratory: TestAmerica Edison (Continued)

Samples DSN 003A Grab (Dam 2 Sewer, #22) (460-161780-1), DSN 004A Grab (Poly, #07 (460-161780-2), DSN 005A Grab RR Ave Ditch, # 21 (460-161780-3) and SWPS (#00) (460-161780-4) were analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were prepared and analyzed on 08/08/2018

No difficulties were encountered during the Hg analysis.

All quality control parameters were within the acceptance limits.

Additionally, no preservative was listed in the chain of custody for Mercury in August 2018 for 003, 004, 005. For 40 CFR 136.3 approved analytical methods for Mercury (CVAA) – Cold Vapor Atomic Absorption, 40 CFR 136.3 Table II specifies that the sample be preserved with HCl or BrCl, However, the notes in footnote 17 (40 CFR 136.3 Table II) state that samples collected for the determination of trace level mercury (<100 ng/L) using EPA Method 1631 must be collected in tightly-capped fluoropolymer or glass bottles and preserved with BrCl or HCl solution within 48 hours of sample collection. **The time to preservation may be extended to 28 days if a sample is oxidized in the sample bottle.**

TestAmerica Edison
777 New Durham Road
Edison, New Jersey 08817
Phone: (732) 549-3900 Fax: (732) 549-3679

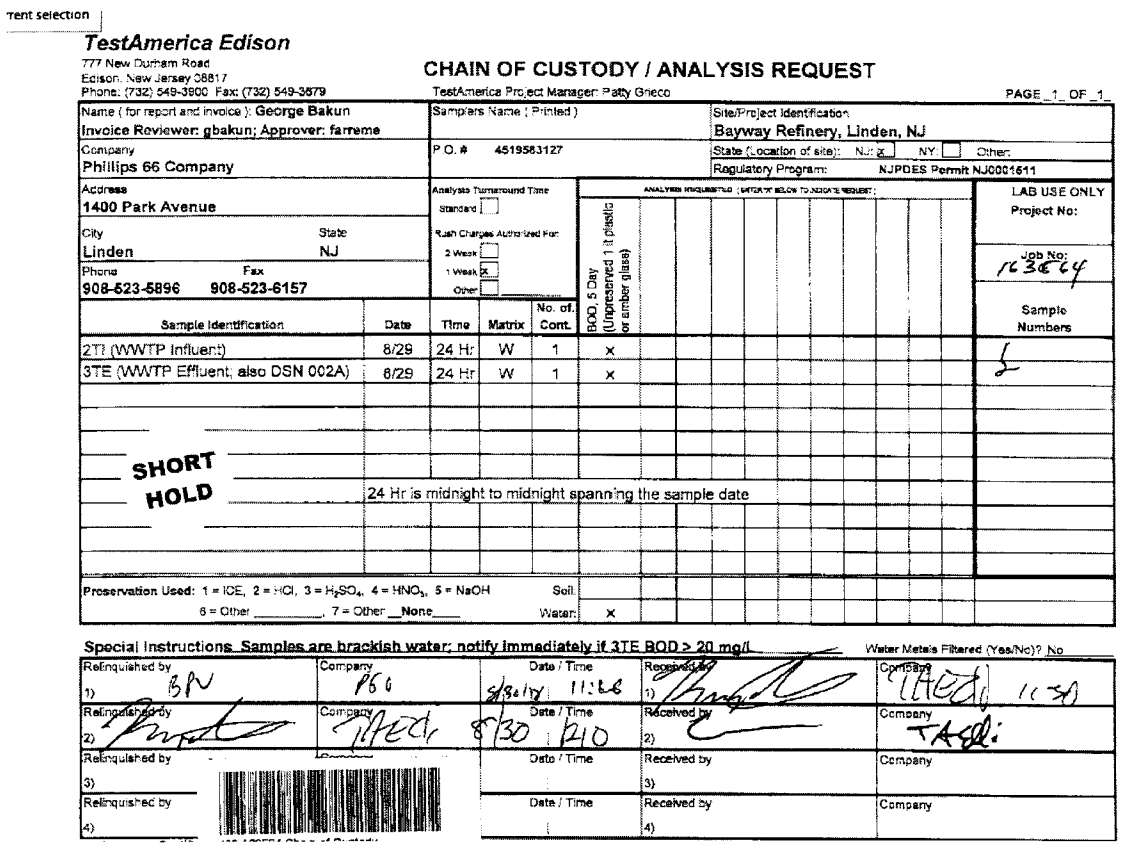
CHAIN OF CUSTODY / ANALYSIS REQUEST
TestAmerica Project Manager: Patty Grieco

PAGE _1_ OF _1_

Name (for report and invoice): George Bakun Invoice Reviewer: gbakun; Approver: farreme	Samplers Name (Printed)						Site/Project Identification Bayway Refinery, Linden, NJ		
Company Phillips 66 Company	P.O. # 4519583127						State (Location of site): NJ: X NY: Other: Regulatory Program: NJPDES Permit NJ0001511		
Address 1400 Park Avenue	Analysis Turnaround Time Standard				ANALYSIS REQUESTED (ENTER 'X' BELOW TO INDICATE REQUEST)				LAB USE ONLY Project No:
City Linden State NJ	Rush Charges Authorized For: 2 Week 1 Week X Other				Benzene, HCl, RL = 7 ppb	Total Metals, 200.8, HNO3, Ni, Zn, Pb, Cu, RL = 10 ppb	Total Hg, RL = 1 ppb		Lab No: 161780
Phone 908-523-5896 Fax 908-523-6157									
Sample Identification	Date	Time	Matrix	No. of Cont.					Sample Numbers
DSN 003A Grab (Dam 2 Sewer, # 22)	8/1/18	9:50	W	3	x				1
DSN 003A Grab (Dam 2 Sewer, # 22)	↓	↓	W	1		x	x		2
DSN 004A Grab (Poly, # 07)	8/1/18	9:30	W	3	x				3
DSN 004A Grab (Poly, # 07)	↓	↓	W	1		x	x		4
DSN 005A Grab RR Ave Ditch, # 21)	8/2/18		W	3	x				5
DSN 005A Grab RR Ave Ditch, # 21)			W	1		x	x		6
SWPS (# 00)	8/1/18	9:20	W	1		x	x		7
Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH 6 = Other _____, 7 = Other None				Soil:					
				Water:	x	x	x		

460-161780 Chain of Custody

c. As shown in the chain of custody form below for BOD from the August 29, 2018, sample it did not note that the sample was preserved with Ice (See Preservation Used Table which indicates that No. 1 is ice, but no note that ice was used). BOD samples must be iced/refrigerated to <= 6 °C per 40 CFR 136.3 Table II.



rent selection

TestAmerica Edison
777 New Durham Road
Edison, New Jersey 08817
Phone: (732) 549-3900 Fax: (732) 549-3679

CHAIN OF CUSTODY / ANALYSIS REQUEST

TestAmerica Project Manager: Patty Grieco

PAGE 1 OF 1

Name (for report and invoice): George Bakun Invoice Reviewer: gbakun; Approver: farneme	Samplers Name (Printed)	Site/Project Identification: Bayway Refinery, Linden, NJ
Company: Phillips 66 Company	P.O. # 4519583127	State (Location of site): NJ: X NY: Other: Regulatory Program: NJPDES Permit NJ0001511
Address: 1400 Park Avenue	Analysis Turnaround Time Standard:	LAB USE ONLY Project No:
City: Linden State: NJ	Rush Charges Authorized For: 2 Week: 1 Week: X Other:	Job No: 16364
Phone: 908-523-5896 Fax: 908-523-6157		

Sample Identification	Date	Time	Matrix	No. of Cont.	BOD, 5 Day (Unpreserved 1 lt plastic or amber glass)	Sample Numbers
2TI (WWTP Influent)	8/29	24 Hr	W	1	x	
3TE (WWTP Effluent, also DSN 002A)	8/29	24 Hr	W	1	x	
SHORT HOLD		24 Hr is midnight to midnight spanning the sample date				

Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH, 6 = Other _____, 7 = Other None
Soil:
Water: x

Special Instructions: Samples are brackish water; notify immediately if 3TE BOD > 20 mg/l

Water Metals Filtered (Yes/No)? No

Relinquished by	Company	Date / Time	Received by	Company
1) BN	P66	8/30/18 11:26	1)	TAEDI 11:30
2)	TAEDI	8/30 1210	2)	TAEDI
3)		Date / Time	3)	Company
4)		Date / Time	4)	Company

9/7/2018

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d. As shown in the August 1, 2018 samples for metals (Copper, Lead, Zinc, Nickel) at outfalls 003, 004, and 005, the contract lab, Test America, has a standard practice to dilute its wastewater samples by a factor of 5. However, the sample results for August 2018 were generally close to the Method Detection Limit ("MDL"). Several sample results were qualified with a "J" (defined in lab report - Results is less than the Reporting Limit but greater or equal to the MDL and the concentration is an approximate value). Given that metals concentrations were at or near the MDL, the contract laboratory should evaluate whether it is appropriate to dilute the metals at Outfalls 003, 004, and 005. Although it is possible that the dilutions may be necessary to avoid matrix interferences, and the dilution may not present a problem so long as it does not impact the ability to determine compliance with Permit Limits.

Detection Summary

Client: Phillips 66
Project/Site: Bayway Refinery, Linden, NJ

TestAmerica Job ID: 460-161780-1

Client Sample ID: DSN 003A Grab (Dam 2 Sewer, #22) — **Lab Sample ID: 460-161780-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Copper	6.1		5.0	3.3	ug/L	5		200.8	Total Recoverable
Lead	2.1		1.5	0.93	ug/L	5		200.8	Total Recoverable
Zinc	19.8	J	20.0	16.3	ug/L	5		200.8	Total Recoverable

Client Sample ID: DSN 004A Grab (Poly, #07 — **Lab Sample ID: 460-161780-2**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Copper	4.0	J	5.0	3.3	ug/L	5		200.8	Total Recoverable
Lead	2.3		1.5	0.93	ug/L	5		200.8	Total Recoverable

Client Sample ID: DSN 005A Grab RR Ave Ditch, # 21 — **Lab Sample ID: 460-161780-3**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Copper	4.6	J	5.0	3.3	ug/L	5		200.8	Total Recoverable
Lead	1.4	J	1.5	0.93	ug/L	5		200.8	Total Recoverable

Client Sample ID: SWPS (#00) — **Lab Sample ID: 460-161780-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Copper	7.5		5.0	3.3	ug/L	5		200.8	Total Recoverable
Lead	2.6		1.5	0.93	ug/L	5		200.8	Total Recoverable

e. As shown in the table below for hexavalent chromium, the loadings reported in the DMR included a datapoint on August 1, 2018 that was out of holding time. This data point would typically not be included in the calculations.

NJ0001511 DSN 002 Hexavalent Chromium Storm Flow Calculation

	Gross 002 Cr+6 Load			Storm	Cr+6 Allocations		Net 002 Cr+6 Load		
	Lab	Flow	Load	Flow	Monthly	Daily	Monthly	Daily	
	mg/L	MGD	kg/d	MGD	kg/d	kg/d	kg/d	kg/d	
8/1/18	< 0.01	8.67	< 0.329	0.21	0.0219	0.0495	< 0.307	< 0.279	Lab inadvertently missed hold time
8/2/18		9.07		0.50					
8/3/18		10.51		1.93					
8/4/18		11.74		2.93					
8/5/18		9.73		1.15					
8/6/18		8.53		0.67					
8/7/18		8.86		0.80					
8/8/18		9.47		0.73					
8/9/18		6.40		0.10					
8/10/18		7.63		0.56					
8/11/18		10.11		2.90					
8/12/18	< 0.01	9.23	< 0.350	0.95	0.0994	0.2248	< 0.250	< 0.125	Resample to meet hold time
8/13/18		10.91		2.83					
8/14/18		10.60		2.45					
8/15/18		8.30		0.22					
8/16/18		8.83		0.06					
8/17/18		10.02		0.97					
8/18/18		9.39		0.58					
8/19/18		10.65		1.75					
8/20/18		8.25		0.45					
8/21/18		9.05		1.09					
8/22/18		9.61		2.06					
8/23/18		9.05		0.70					
8/24/18		9.04		0.92					
8/25/18		8.62		0.91					
8/26/18		8.50		0.71					
8/27/18		8.10		0.34					
8/28/18		6.97		0.16					
8/29/18		6.95		0.00					
8/30/18		7.02		0.00					
8/31/18		8.53		0.24					
min =	< 0.010	6.40	< 0.329	0.000	0.0219	0.0495	< 0.250	< 0.125	
max =	**< 0.010**	11.74	**< 0.350**	2.931	0.0994	**0.2248**	**< 0.307**	**< 0.279**	
avg =	< 0.010	8.98	< 0.339	0.964	**0.0606**	0.1371	< 0.279	< 0.202	
total =	< 0.020	278.34	< 0.679	29.873	0.1213	0.2742	< 0.557	< 0.404	

f. The August 2018 lead result for 002 was reported in the DMR as <0.015 mg/L. However, the lab report had a result of 1.3J ug/L and the Reporting Limit for lead in the lab report appeared to be missing a decimal point. See lead result where the 5 appears to be below other entries that are in the 1/10th decimal column. The loading (kg/day) entry does appear to be based upon a concentration of 1.5 ug/L (0.0015 mg/L)

	RQL	0.44	0.44		*****	0.01	0.01				
Lead, Total (as Pb)	Sample Measurement	<0.05	<0.05	KG/DAY	*****	<0.015	<0.015	MG/L	0	1 Month	COMP24
01051 1 Effluent Gross Value	Permit Requirement	5.8 01MOAV	7.3 01DAMX		*****	REPORT 01MOAV	REPORT 01DAMX			1/Month	COMP24
	RQL	0.44	0.44		*****	0.01	0.01				

Client Sample Results

Client: Phillips 66
Project/Site: Bayway Refinery, Linden, NJ

TestAmerica Job ID: 460-161757-1

Client Sample ID: DSN 002A Composite (3TE)
Date Collected: 08/01/18 23:59
Date Received: 08/02/18 13:05

Lab Sample ID: 460-161757-1
Matrix: Water

Method: 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	3.1	U	5.0	3.1	ug/L		08/05/18 03:00	08/06/18 01:24	5
Copper	6.5	U	10.0	6.5	ug/L		08/05/18 03:00	08/11/18 16:25	10
Nickel	9.4		5.0	3.1	ug/L		08/05/18 03:00	08/06/18 01:24	5
Lead	1.3	J	1.5	0.93	ug/L		08/05/18 03:00	08/06/18 01:24	5
Zinc	33.1		20.0	16.3	ug/L		08/05/18 03:00	08/06/18 01:24	5

General Chemistry

6

g. The July 2018 intake sample for Bis (2-ethylhexyl) phthalate was conducted using Method 8270C which is not a listed approved method in 40 CFR Part 136. Please verify with lab whether there is a separate approval (via NJDEP or EPA) to utilize this method.

Client Sample ID: SWPS (#00) **Lab Sample ID: 460-160261-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bis(2-ethylhexyl) phthalate	2.3	J	4.8	2.1	ug/L	1		8270C	Total/NA
Arsenic	2.3	J	2.5	1.5	ug/L	5		200.8	Total Recoverable
Barium	24.7		5.0	3.2	ug/L	5		200.8	Total

5

h. As shown in the table below the laboratory (Test America) is using SW-846 Method 8270C for analysis of semi-volatiles. This method (8270C) is not an 40 CFR Part 136 approved wastewater method. Please verify with lab whether there is a separate approval (via NJDEP or EPA) to utilize this method or if not, the lab must use a 40 CFR Part 136 approved method.

Client Sample Results

Client: Phillips 66
Project/Site: Semiannual DSN 003, 004 & 005

TestAmerica Job ID: 460-160261-1

Client Sample ID: DSN 003A Grab (DAM 2 Sewer, #22)
Date Collected: 07/11/18 08:45
Date Received: 07/11/18 13:45

Lab Sample ID: 460-160261-2
Matrix: Water

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrobenzene	0.54	U	1.0	0.54	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosodiethylamine	1.1	U	5.2	1.1	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosodimethylamine	0.23	U	1.0	0.23	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosodi-n-butylamine	1.3	U	5.2	1.3	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosodi-n-propylamine	0.26	U	1.0	0.26	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosodiphenylamine	0.46	U	1.0	0.46	ug/L		07/16/18 08:38	07/18/18 19:02	1
N-Nitrosopyrrolidine	0.43	U	2.1	0.43	ug/L		07/16/18 08:38	07/18/18 19:02	1
Pentachlorobenzene	1.7	U	5.2	1.7	ug/L		07/16/18 08:38	07/18/18 19:02	1
Pentachlorophenol	3.2	U	10	3.2	ug/L		07/16/18 08:38	07/18/18 19:02	1
Phenanthrene	0.17	U	0.21	0.17	ug/L		07/16/18 08:38	07/18/18 19:02	1
Phenol	0.13	U	1.0	0.13	ug/L		07/16/18 08:38	07/18/18 19:02	1
Pyrene	0.18	U	0.21	0.18	ug/L		07/16/18 08:38	07/18/18 19:02	1

6

i. The Facility's contract laboratory utilized method 8141B for pesticides such as Malathion Chlorpyrifos, and Guthion . This method (8141B) is not a 40 CFR Part 136 approved wastewater method. Please verify with lab whether there is a separate approval (via NJDEP or EPA) to utilize this method or if not, the lab must use a 40 CFR Part 136 approved method.

Method: 8141B - Organophosphorous Compounds by Gas Chromatography, Capillary Column Technique

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Guthion	0.23	U	3.5	0.23	ug/L		07/16/18 09:09	07/31/18 11:06	1
Chlorpyrifos	0.50	U	2.1	0.50	ug/L		07/16/18 09:09	07/31/18 11:06	1
Parathion	0.20	U	1.4	0.20	ug/L		07/16/18 09:09	07/31/18 11:06	1
Malathion	0.19	U	2.8	0.19	ug/L		07/16/18 09:09	07/31/18 11:06	1
Demeton	0.29	U	4.2	0.29	ug/L		07/16/18 09:09	07/31/18 11:06	1

TestAmerica Edison

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8/2/2018

j. The Facility's contract laboratory utilized method 8081B for the pesticide, Mirex. This method (8081B) is not a 40 CFR Part 136 approved wastewater method. Please verify with lab whether there is a separate approval (via NJDEP or EPA) to utilize this method or if not, the lab must use a 40 CFR Part 136 approved method.

[illegible]	90		60 - 140				07/12/18 09:30	07/16/18 10:48	1

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mirex	0.0088	U	0.052	0.0088	ug/L		07/17/18 13:15	07/19/18 02:48	1

k. As shown in the tables below there are calculations for the loading allocation (Calculation Adjustment) per Part IV.C.2 (Contaminated Stormwater Allocation) value based upon the Storm Flow (3TE – V345) during days in which there was no recorded rainfall. For example, during the period August 23 to 28, 2018, there was no precipitation, yet the Storm Flow was recorded as 0.70, 0.92, 0.91, 0.71, 0.34, and 0.16 MGD respectively. Explain the methodology for determining storm water flow including the storm water flow on dates when there is no rainfall – such as draining tank dikes.

Condenser Sewer Flow Calculation (MGD) - Must updat

Day	Rain (Inches)	Measured Flows 3TE V146	Dam 1 V153	3TE Calcu Storm Q V345
7/31/18	0.00	9.20	185.95	0.71
8/1/18	0.08	8.67	189.63	0.21
8/2/18	0.82	9.07	184.75	0.60
8/3/18	0.43	10.51	213.01	1.93
8/4/18	0.74	11.74	235.08	2.93
8/5/18	0.00	9.73	206.25	1.15
8/6/18	0.00	8.53	194.67	0.67
8/7/18	0.12	8.86	197.60	0.80
8/8/18	0.00	9.47	186.46	0.73
8/9/18	0.05	6.40	191.92	0.10
8/10/18	0.00	7.63	180.23	0.56
8/11/18	1.57	10.11	207.93	2.90
8/12/18	0.00	9.23	176.57	0.95
8/13/18	0.66	10.91	169.63	2.83
8/14/18	0.33	10.60	154.08	2.45
8/15/18	0.00	8.30	189.39	0.22
8/16/18	0.00	8.83	185.34	0.06
8/17/18	0.15	10.02	182.12	0.97
8/18/18	0.13	9.39	213.71	0.58
8/19/18	0.46	10.65	218.38	1.75
8/20/18	0.00	8.25	172.42	0.45
8/21/18	0.01	9.05	170.76	1.09
8/22/18	0.96	9.61	195.77	2.06
8/23/18	0.00	9.05	182.27	0.70
8/24/18	0.00	9.04	171.63	0.92
8/25/18	0.00	8.62	167.82	0.91
8/26/18	0.00	8.50	163.99	0.71
8/27/18	0.00	8.10	179.13	0.34
8/28/18	0.00	6.97	183.89	0.16
8/29/18	0.00	6.95	183.80	0.00
8/30/18	0.00	7.02	184.33	0.00
8/31/18	0.10	8.53	202.21	0.24
Min	0.00	6.40	154.08	0.00
Max	1.57	11.74	235.08	2.93
Avg	0.20	8.98	188.17	0.96
Total	6.11	278.34	5833.17	29.87
No	31	31	31	31

Notes:
1) Total Condenser Sewer Flow = Dry Weather Dam 1 - Dr
2) Use "Units" Worksheet to calculate daily flow distribution
3) Runoff for the 3 discharges assumes 0.9 coefficient and
4) Not all of the flow passes through the monitoring points
5) Direct flows into Morses Creek are excluded from the ab

NJ0001511 DSN 002 BOD Storm Flow Calculation

	Gross 002 BOD Load			Storm	BOD Allocations		Net 002 BOD Load	
	Lab	Flow	Load	Flow	Monthly	Daily	Monthly	Daily
	mg/L	MGD	kg/d	MGD	kg/d	kg/d	kg/d	kg/d
8/1/18		8.67		0.21				
8/2/18		9.07		0.50				
8/3/18		10.51		1.93				
8/4/18	**1.3**	11.74	**57.86**	2.93	293.12	532.94	**0**	**-475.08**
8/5/18	**1.2**	9.73	**44.26**	1.15	115.07	209.22	**0**	**-164.96**
8/6/18		8.53		0.67				
8/7/18		8.86		0.80				
8/8/18		9.47		0.73				
8/9/18		6.40		0.10				
8/10/18		7.63		0.56				
8/11/18	**1.3**	10.11	**49.82**	2.90	290.00	527.27	**0**	**-477.45**
8/12/18	**2.8**	9.23	**97.97**	0.95	95.09	172.89	**2.88**	**-74.92**
8/13/18		10.91		2.83				
8/14/18		10.60		2.45				
8/15/18		8.30		0.22				
8/16/18		8.83		0.06				
8/17/18		10.02		0.97				
8/18/18	**1.0**	9.39	**35.60**	0.58	58.47	106.30	**0**	**-70.71**
8/19/18	< 1.0	10.65	< 40.37	1.75	175.14	318.43	**0**	-< 278.06
8/20/18		8.25		0.45				
8/21/18		9.05		1.09				
8/22/18		9.61		2.06				
8/23/18		9.05		0.70				
8/24/18		9.04		0.92				
8/25/18	**2.3**	8.62	**75.16**	0.91	90.92	165.31	**0**	**-90.15**
8/26/18	**1.7**	8.50	**54.78**	0.71	70.67	128.48	**0**	**-73.71**
8/27/18		8.10		0.34				
8/28/18		6.97		0.16				
8/29/18	< 1.0	6.95	< 26.35	0.00	0.00	0.00	13.17	< 26.35
8/30/18		7.02		0.00				
8/31/18		8.53		0.24				
min =	< 1.0	6.40	< 26.35	0.000	0.00	0.00	0.00	-< 477.45
max =	**2.80**	11.74	**97.97**	2.931	293.12	**532.94**	13.17	**26.35**
avg =	**1.40**	8.98	**49.87**	0.964	**132.05**	240.09	**1.78**	-< 186.62
total =	< 13.60	278.34	< 482.17	29.873	1188.47	2160.85	16.06	-< 1678.68
count =	9	31	9	31	9	9	9	9
						Limit =	**1,085**	**2,088**

Notes:

1) For mix of < MDL & detected values, use 1/2 MDL to average ND & report max detected value

2) For all ND, report max < value for average

3) Use zero if stormwater allowance > gross load

16. The following excerpts are concerns related to the chain of custody sheets for the samples that are analyzed in the on-site lab for August 2018:

a. for samples collected on August 28 and 29, 2018. Please explain the date August 23, 2018 as the relinquished date for these Aug 28 and 29, 2018 samples. If this is for maintaining custody on the empty sample bottle, perhaps the first line of the relinquished can identify that as such.

Phillips66 Bayway Refinery Laboratory (ID #207732)

Analysis Request Form and Chain of Custody for the Receipt of Samples

DSN01 GRAB COMPLIANCE SAMPLES

COMPOSITE SAMPLE POINTS DSN01 NJPDES #NJ0011511			SAMPLER TO COMPLETE SECTION BELOW		SAMPLE RECEIPT REQUIREMENTS FOR BOTTLES TO BE COMPLETED BY TECHNICIAN UPON RECEIPTS (IF NO, EXPLAIN)
SAMPLE ID	BOTTLE AND PRESERVATION ADDED	DSAM	SAMPLE TAKEN: DATE	TIME	
DSN01 #1	QUART GLASS 5.0 mL 6N HCl PREPARED BY: SB	PHC HEM 1664A-SGT 7-DAY HOLD TIME	SUNDAY TUESDAY 8.28.17 THURSDAY	0700	1. IS CHAIN OF CUSTODY COMPLETE? ✓ 2. ARE SAMPLE LABELS INTACT? ✓ 3. ARE SAMPLES IN APPROVED LAB-CLEANED AND PREPPED BOTTLES? ✓ 4. ARE SAMPLES WITHIN SPECIFIED HOLDING TIME ✓
DSN01 #2	QUART GLASS 5.0 mL 6N HCl PREPARDED BY: SB	PHC HEM 1664A-SGT 7-DAY HOLD TIME	SUNDAY TUESDAY 8.28.17 THURSDAY	0700	5. DO BOTTLES CONTAIN SUFFICIENT SAMPLE? ✓ 6. ARE SAMPLES IN COOLER OF CRUSHED ICE? ✓ 7. DO SAMPLE IDS ON BOTTLES MATCH IDS ON CUSTODY AND ARE ALL BOTTLES PRESENT? ✓
DSN01 #3	QUART GLASS 5.0 mL 6N HCl PREPARDED BY: SB	PHC HEM 1664A-SGT 7-DAY HOLD TIME	SUNDAY TUESDAY 8.28.17 THURSDAY	0700	8. IS COOLER TEMPERATURE AT 4C OR LESS ✓ 9. HAVE YOU COMPLETED pH CHECK ON BOTTLES pH < 2 [ ]

RELINQUISHED BY: SB DATE: 8/23/18 TIME: 1415 RECEIVED BY: LP DATE: 8.27.2018 TIME: 2200

RELINQUISHED BY: LP DATE: 8.28.2018 TIME: 0500 RECEIVED BY: Shaya DATE: 8.28.18 TIME: 0500

RELINQUISHED BY: Shaya DATE: 8.28.18 TIME: 1100 RECEIVED BY: SM DATE: 8.28.18 TIME: 1100

Phillips 66 Corporation Bayway Refinery Laboratory (ID#207732)

Analysis request form and chain of custody for the receipt of secondary treatment samples

DSN00 Grab compliance samples

Grab Sample Point: DSN00 NJPDES # NJ0001511			Sample to complete Section Below		Sample receipt requirements (all Bottle) To be completed by Technician upon receipt. (If no, explain and indicate which bottle(s))
Sample ID	Bottle & Preservation Added	DSAM	Sample Taken: Date	Time	
DSN00 #1 (Quart glass) Bottle # 016593	Quart glass No chemical preservation	pH SM 4500H+B 15 MINUTES HOLD TIME	8/29	12:58PM	1. Chain of custody completely and properly filled out? YES ✓ NO 2. Sample labels intact, legible and properly filled out? YES ✓ NO 3. Samples in approved lab-precleaned bottles, capped, undamaged and intact? YES ✓ NO 4. Samples with specified holding time? YES ✓ NO 5. Bottle contains sufficient sample volume? YES ✓ NO 6. Do samples ID's on bottles match ID's on custody and are all bottles present? YES ✓ NO

TO BE COMLETED BY LABORATORY TECHNICIAN IF SAMPLE IS OUTISIDE HOLDING TIME

Sample reject by _____ (Signature) Date _____ Time _____

Comments: _____

Was notified by _____ Date _____ Time _____

Sample relinquished by: SB (Lab technician) Date 8/23/18 Time 1415 Received by _____ (Operator) Date 8/29/18 Time 0900

Sample relinquished by: _____ (Sampler) Date 8/29/18 Time 1031PM Received by SB (Lab technician) Date 8/29/18 Time 0803

Sampler comments, if any _____ Initial _____

b. for many of the August 2018 chain of custody sheets for composite samples at Outfall 002 the chain of custody sheets do not identify that the samples are refrigerated. Samples such as Total Suspended Solids, Phenolics, Ammonia, Sulfides and Total Organic Carbon are required to be cooled to ≤6 °C

DSN002 #2	GALLON GLASS 5.0 mL 45% H_3PO_4 PREPARED BY: SB	TOC SM 5310 D B-11 28-DAY HOLD TIME	8/26 1350 TEMPERATURE OF DSN002 COMPOSITOR AT COLLECTION IS _____ °C	5. DO BOTTLES CONTAIN SUFFICIENT SAMPLE? ✓ 6. ARE SAMPLES IN COOLER OF CRUSHED ICE? ✓
DSN002 #3	GALLON GLASS 7.0 mL Zinc Acetate 4.0 mL 6N NaOH PREPARED BY: SB	Sulfide SM 4500-S B,C plus D-11 7-DAY HOLD TIME	COOLER TEMPERATURE UPON RECEIPT: TEMPERATURE: _____ °C TECHN INITIALS: _____	7.DO SAMPLE IDS ON BOTTLES MATCH IDS ON CUSTODY AND ARE ALL BOTTLES PRESENT? ✓ 8. IS COOLER TEMPERATURE AT 4C OR LESS ✓ 9. HAVE YOU COMPLETED pH CHECK ON BOTTLES TOC < pH 2 [ ] Sulfides: pH > 9 [ ]

RELINQUISHED BY: SB DATE: 8/23/18 TIME: 1500 RECEIVED BY: _____ DATE: 8/25/18 TIME: 0700
RELINQUISHED BY: CM DATE: 8/26 TIME: 2359 RECEIVED BY: SB DATE: 8/27/18 TIME: 2355
RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY: _____ DATE: _____ TIME: _____

Phillips66 Bayway Refinery Laboratory (ID #207732)

Analysis Request Form and Chain of Custody for the Receipt of Samples

DSN002 COMPOSITE COMPLIANCE SAMPLES

MONDAY

COMPOSITE SAMPLE POINTS DSN002 NJPDES #NJ0011511			SAMPLER TO COMPLETE SECTION BELOW		SAMPLE RECEIPT REQUIREMENTS FOR BOTTLES TO BE COMPLETED BY TECHNICIAN UPON RECEIPTS (IF NO, EXPLAIN)
SAMPLE ID	BOTTLE AND PRESERVATION ADDED	DSAM	DATE	TIME	
DSN002 #1	GALLON GLASS NO CHEMICAL PRESERVATION PREPARED BY: SB	TSS SM2540 D D-11 7-DAY HOLD TIME	SAMPLER STARTED: 8/26	2350	1. IS CHAIN OF CUSTODY COMPLETE? ✓ 2. ARE SAMPLE LABELS INTACT? ✓ 3. ARE SAMPLES IN APPROVED, LAB-CLEANED AND PREPPED BOTTLES? ✓ 4. ARE SAMPLES WITHIN SPECIFIED HOLDING TIME ✓
DSN002 #2	GALLON GLASS 5.0 Ml 45% H_3PO_4 PREPARDED BY: SB	TOC SM 5310 D B-11 28-DAY HOLD TIME	SAMPLE COMPOS TE COLLECTED: 8/27 TEMPERATURE OF DSN002 COMPOSITOR AT COLLECTION IS _____ °C	2350	5. DO BOTTLES CONTAIN SUFFICIENT SAMPLE? ✓ 6. ARE SAMPLES IN COOLER OF CRUSHED ICE? ✓
DSN002 #3	GALLON GLASS 3.0 mL H_2SO_4 PREPARDED BY: SB	PHENOLICS EPA 420.1 OR AMMONIA AS N SM4500-NH_3 D-11 28-DAY HOLD TIME	COOLER TEMPERATURE UPON RECEIPT: TEMPERATURE: _____ °C TECHN INITIALS: _____		7.DO SAMPLE IDS ON BOTTLES MATCH IDS ON CUSTODY AND ARE ALL BOTTLES PRESENT? ✓ 8. IS COOLER TEMPERATURE AT 4C OR LESS ✓ 9. HAVE YOU COMPLETED pH CHECK ON BOTTLES TOC < pH 2 [ ], AMMONIA pH < 2 [ ]

RELINQUISHED BY: SB DATE: 8/23/18 TIME: 1630 RECEIVED BY: _____ DATE: 8/24/18 TIME: 0700
RELINQUISHED BY: A.Alfaro DATE: 8/27 TIME: 2359 RECEIVED BY: SB DATE: 8/27/18 TIME: 2355
RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY: _____ DATE: _____ TIME: _____

	PREPARED BY: SB/JP	7-DAY HOLD TIME	COMPOSITOR AT COLLECTION IS _____ °C	6. ARE SAMPLES IN COOLER OF CRUSHED ICE? ✓
	GALLON GLASS	AMMONIA AS N	COOLER TEMPERATURE UPON RECEIPT:	7.DO SAMPLE IDS ON BOTTLES MATCH IDS ON CUSTODY AND ARE ALL BOTTLES PRESENT? ✓
DSN002 #3	3.0 mL H_2SO_4	SM4500-NH_3 D-11	TEMPERATURE: _____ °C	8. IS COOLER TEMPERATURE AT 4C OR LESS ✓
	PREPARED BY: SB/JP	28-DAY HOLD TIME	TECHN INITIALS: _____	9. HAVE YOU COMPLETED pH CHECK ON BOTTLES TOC < pH 2 [✓] AMMONIA pH < 2 [✓]

RELINQUISHED BY: SB/JP DATE: 8/28/18 TIME: 0315 RECEIVED BY: [illegible] DATE: 8/28/18 TIME: 0900

RELINQUISHED BY: [illegible] DATE: 8/28/18 TIME: 2355 RECEIVED BY: [illegible] DATE: 8/29/18 TIME: [illegible]

RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY: _____ DATE: _____ TIME: _____

C. Other Observations for Permit NJ0001511

1. Facility reported that it has dual feed power from PSE&G and can also get power from COGEN. The pumps for Tank 519 (18 MG) which receives stormwater/upset water are also equipped with dual power feed.

2. As shown in photos 770 to 772 (Att. 1b) wastewater from Infineum a (joint Shell/Exxon facility) that makes additives, goes thru an API separator and then to the Bayway WWTP. There are two Infineum API separators that discharge to the Bayway WWTP. The sludge removal rakes in the Infineum API separator are not run. Oil is removed from an open recovery pipe at the top of the separator. The Infineum API separator effluent (to the Bayway WWTP) are monitored for parameters such as TOC, TSS, and Zinc.

3. On June 20, 2019 the Arthur Kill (Salt Water) intake pump station was visited. The station is used to provide once through cooling water for Phillips 66 and Infineum. The Facility Representative said that bleach is added at the influent for 1 hour at a time up to 2 hours per day. Up to 250 gallons of 12.5% bleach per hour. The Facility representatives said that they conduct monitoring of the chlorine residual approximately an hour after the start of bleach application (start adding bleach at 9AM, and monitor at 10 AM). Additionally, the facility is adding Clam-Trol to control blue mussels. The Facility representative reported that when Clam-Trol is added, bleach is not added. The intake travelling screens are not run when the Clam-Trol is being added and therefore the travelling screens were not being run when the Salt Water.

   Intake pumps are controlled based upon pressure in the main. The intake pump house has 2 steam driven pumps that are run with steam from the CoGen facility. The remainder of the pumps are run by electric motors. There are 9 pumps, but can run 8 at a time and one is a backup._Intake temperature at the Salt Water Pump Station at the time 68.62 F. The Facility representative said that the flow meter was calibrated once per month and submitted documentation of monthly calibrations of the influent and effluent temperature instruments.

4. _The Clam-Trol (BPC 68940) biocide, photos 880 and 881 was kept within secondary containment. The oil drums at the pump station, photo 882, is stored within the building which was said to be contained and act as secondary containment.

5. Salt water (Arthur Kill) Pump Station sanitary wastewater is sent to adjacent raised leach field (See Photo 884)

6. Two years of Calibration Records for the following were provided by the Facility following the inspection and demonstrated that:

    a. Ultrasonic head sensors at Outfall 001 both upstream and downstream of the dam are calibrated on a monthly basis. The weir dimension for Outfall 001 was not provided in the calibration records.

    b. The two temperature probes for Outfall 001 (Dam 1) and the refinery influent (Salt Water Pump Station) are calibrated on a monthly basis;

    c. The head measurements for the Parshall Flume at Outfall 002 is calibrated on a monthly basis;

7. Following the inspection, the Facility provided its Final PCB Sampling Report (PCB Source Characterization Study) dated December 11, 2015 produced by the Facility's consultant, Kleinfelder. The PCB report was submitted as required by IV.D.3.a.vii of the Permit. The report identified that the PCBs at the WWTP (Outfall 002) originate from the influent surface waters and that there was no justification for a Pollutant Minimization Program under part IV.D.3.c of the Permit.

8. During the inspection the inspectors drove near the barge loading dock. When loading fuel at the barge dock booms are placed around ship for heavy fuels, but not when gasoline is loaded.

9. Booms in the discharge channels are maintained by Miller Marine.

10. The East Side Retention Basin (listed in Part IV.G.4) of the Permit, which handled process unit flows from the butanes, propanes, butylenes and propylenes has been closed and said to be no longer used.

III. INDIVIDUAL STORMWATER PERMIT (NJ0026671)

A. Outfall Observations (NJ0026671) Including PNCs and AOCs seen at outfalls

Line No.	Outfall	Photos (Att. 1a)	COMMENTS	AOC or PNC
1	006A	710, 711	(S1 Refinery Access Road) No discharge – dry weather – sediment accumulated along roadside would wash into catch basin and discharge. Need to sweep roadside.	AOC
2	011A	712,713	Outfall 011 drains Brunswick Ave. catch basin has some litter and debris on it. No sheens seen in catch basins. No Discharge Seen. Need to clean catch basin grate.	AOC
3	017A -	714-718	40 Acre Separator. No sheens were seen on the separator or in the discharge. The discharge valves were closed, but there was a discharge of clear water over the high level weir (which is said to be from a downward turned elbow -discharging 2 to 3' below surface). The Valve Head on one of the outlet valves was broken (see photo 717 Att. 1a). Discharge was thought to be coming from when the retention basin valves were recently opened. During the inspection the retention basin valves were said to be closed. (Said that 3 rounds to check the retention basin are done per shift)	AOC – Valve Head
4	018A	Att. 1a 725-728	No sheens. Appears that this outfall may be labelled as 015 and not 018. Please verify that outfall signs are accurate	AOC - Sign

5	010	748-753	As shown in photos 748 to 752 (taken on June 12, 2019) (Att. 1a), the Tremley Tank Field separator had a layer floating oil in the separator, the banks were oil stained, and there was a sheen and an oily sorbent pig in the outlet chamber prior to the outlet valve. Outfall 010 discharges to Morses Creek,but has no monitoring requirements in the SW Permit. The Facility representative said that this separator drains a large tank field, but there is no process sewer in the vicinity to route flows to the WWTP. During the June 12, 2019 inspection, as shown in photo 753 the outlet of the 010 channel prior to entering Morses Creek did not have a sheen. Daily visual inspections of the Tremley separator are conducted and records for January through June 2019 were provided to EPA following the inspection. However, the visual inspections of the separator on June from 11, 12, and 13 (Att. 5) did not identify any accumulated oil in the outlet box. But EPA and NJDEP did identify a sheen and oily sorbent pig in the outlet box on June 12, 2019. Proper operation and maintenance of the separator (a Best Management Practice) is required under Parts IV.E.F. and G of the SW Permit in accordance with the Permit. And Operators should be trained to identify oil in the outlet box as well as a layer of oil in the separator itself that necessitates cleaning of the Separator. The outfall from this separator does not currently have chemical monitoring requirements in the permit, but NJDEP has requested that monitoring of the discharges from this outfall be conducted for parameters and frequency consistent with other outfalls in the stormwater permit.	PNC
6	007	763	No discharge from diesel tank valve. As shown in photo 763 (Att. 1a) the diesel tank dike water did not have a sheen	
8	009		No discharge from butane storage area. Said that during high tides it is difficult to obtain a sample. Need to provide protocols for sampling during high tide.	AOC

B. **Potential Noncompliance Items**

1. As shown in Att. 1.a photos 738 to 744 (June 12, 2019) taken in the Tank 519 Waste Management Area, the Facility failed to properly manage and control waste materials in and around dumpsters as required by Stormwater Part F.1.f.ii of the SW Permit. Additionally, Part E.1 requires proper operation and maintenance of the facility. Part VI of the Facility's Stormwater Pollution Prevention Plan ("SPPP") requires roll-offs to be covered except when being loaded or unloaded and requires weekly inspections. The inspection identified that:

    a. Dumpster covers were torn and not being maintained.
    b. Dumpsters contained oil wastewater/stormwater and were leaking on the ground.
    c. Oily material/hay was seen outside of the dumpsters.
    d. As shown in photo 744, there were Plastic polypropylene pellets were on the ground outside of a dumpster.
    e. As shown in photos 746 and 747 (Att. 1a) there was an accumulation of water around material storage piles (sand blast and PE Pellets) in the Tank 519 Waste Management Area. Run-on into this storage area should be diverted away from material storage piles.

The Facility representative indicated that this area was to be inspected once per week, however judging by the condition of the covers and accumulation of oil water inside and around the dumpsters it does not appear that weekly inspections were taking place. The Facility representative said that they would report this to NJDEP by filing an incident report of discharge to ground. This portion of the Facility was not being operated and maintained in accordance with Part E and F of the SW Permit.

C. **Areas of Concern**

1. The Individual Stormwater Permit expired on May 31, 2012 and has not been renewed.

2. Rail Car Unloading:

    a. As shown in Att. 1a. Photo 719, there was a catch basin surrounded by unstabilized soils at the railcar unloading area. Also see photo 720 that shows more unstabilized soils at the rail car unloading area.

    b. As shown in Att. 1.a photos 722 to 724 there is a manhole near the oil water separator in the rail car unloading area that has overflowed oil onto the ground. The Facility must cease the manhole overflows and redesign the system accordingly to prevent overflows. The Facility was considering raising the level of the manhole.

3. As shown in photo Att. 1.a. 725 the sign says Outfall 015A, but the Facility refers to this Rahway River Tank field SW discharge as Outfall 018A. Outfalls must be properly

labelled. Additionally, the separator valves remain open at this unmanned separator that serves the Rahway River Tank Farm. The outflow is from a downturned elbow. Please verify the inspection frequency of this and other separators (at least some were said to be inspected 3 times per shift) to ensure that spills would be noticed in a timely manner to avoid oil discharges via the open valves.

4. As shown in photos 730 and 731 (Att. 1a) the secondary containment for the additive totes in the Rahway River Tank Field had fallen down and was not operational or effective.

5. As shown in photos 732 to 734 in Att. 1.a there was puddling of water near the hazardous waste staging area drain valves. There was also spalling of the concrete near the drain valves. Please evaluate the source of this water, and eliminate if necessary, any leakage thru the dike.

6. As shown in photo 735 Att. 1.a there was an open waste dumpster in the Exxon Storage area. There were also drums stored in this area without secondary containment, see photos 736 and 737.

7. As shown in Att. 1a photos 754 to 756 the Exxon RCRA area had large amounts of unstabilized soils. There was some erosion seen near the silt fencing (see photo Att. 1.a. 754). Explain whether this area has been stabilized.

8. For Outfalls 017 and 009 the EPA and NJDEP representatives inquired about whether there the refinery had a program of valve maintenance (017 had a broken valve head).

9. The Linden Truck Loading terminal loads between 300 to 1,000 trucks per day and operates 24 hours per day, 7 days per week. The inspectors toured this portion of the facility with John Dougherty. As shown in photos 765 and 766 in Att. 1b there was an uncovered dirt material storage pile adjacent to the salt pile. The material storage pile was associated with an excavation for concrete work. The SW Permit specifies that the SPPP - Part F.1.f.iii -must address pavement and access road repairs with the potential to erode or discharge solids (soils and/or sediments) to surface waters. Material storages of this nature are typically kept covered except when material being added or removed. The loading rack lift station has a high-level alarm. Also verify whether the loading rack O/W separator is routinely inspected and which outfall receives the loading rack O/W separator flow.

10. The Facility representative indicated that there had been, in the past, a Stormwater pump failure in 2018 at the Elizabeth Tank Farm. They said that if the pump fails there would be no discharge. Please report on the operational status of the Elizabeth Tank Farm Pump.

IV. CLOSING

At the close of the inspection on most days, the EPA and NJDEP inspectors discussed most but not all of the Findings with the Facility Representatives.

ATTACHMENTS

Attachment 1.a – Photographs June 12, 2019
Attachment 1.b – Photographs June 13, 2019
Attachment 1.c – Photographs June 20, 2019
Attachment 2 - Facility Description from the Fact Sheet
Attachment 3 – NJ0001511 process/stormwater flow and treatment diagrams
Attachment 4 – select pages (conclusions, cover letter) from the 2014 Impingement Alternatives Analysis.
Attachment 5 – Tremley Separator Inspection Log June 10 to 15, 2019

Att. 1a Photographs
Phillips 66, Bayway Refinery, Linden NJ, June 12 and 13, 2019
Unedited Digital Photos Taken by
Murray Lantner, P.E., Env. Eng
EPA Region 2, ECAD-WCB
Nikon Coolpix P510 Digital Camera

Bayway Refinery June 12, 2019

DSCN6710 – Stormwater Permit Outfall 006 – sediment accumulated on side of road. No Discharge – dry weather

DSCN6711 – Stormwater Permit Outfall 006 – sediment accumulated on side of road. No Discharge – dry weather

DSCN6712 – SW Outfall No. 011

DSCN6713 – Material on catch basin along New Brunswick Ave tributary to Outfall 011

DSCN6714 – Outfall 017 Separator balls covering portion of surface, no sheens seen.

DSCN6715 – Outfall 017 outlet valves –valves shut – one valve head broken. Discharge occurring over high level weir

DSCN6716 - Outfall 017

DSCN6717 – One of the 2 Valve Heads at Outfall 017 was broken

DSCN6718 – Outfall 017 outlet – no sheens seen

DSCN6719 – unstabilized soils around catch basin at the rail car unloading area

DSCN6720 – unstabilized soils in the rail car unloading area

DSCN6721 – drip pan at rail car unloading with oil in it.

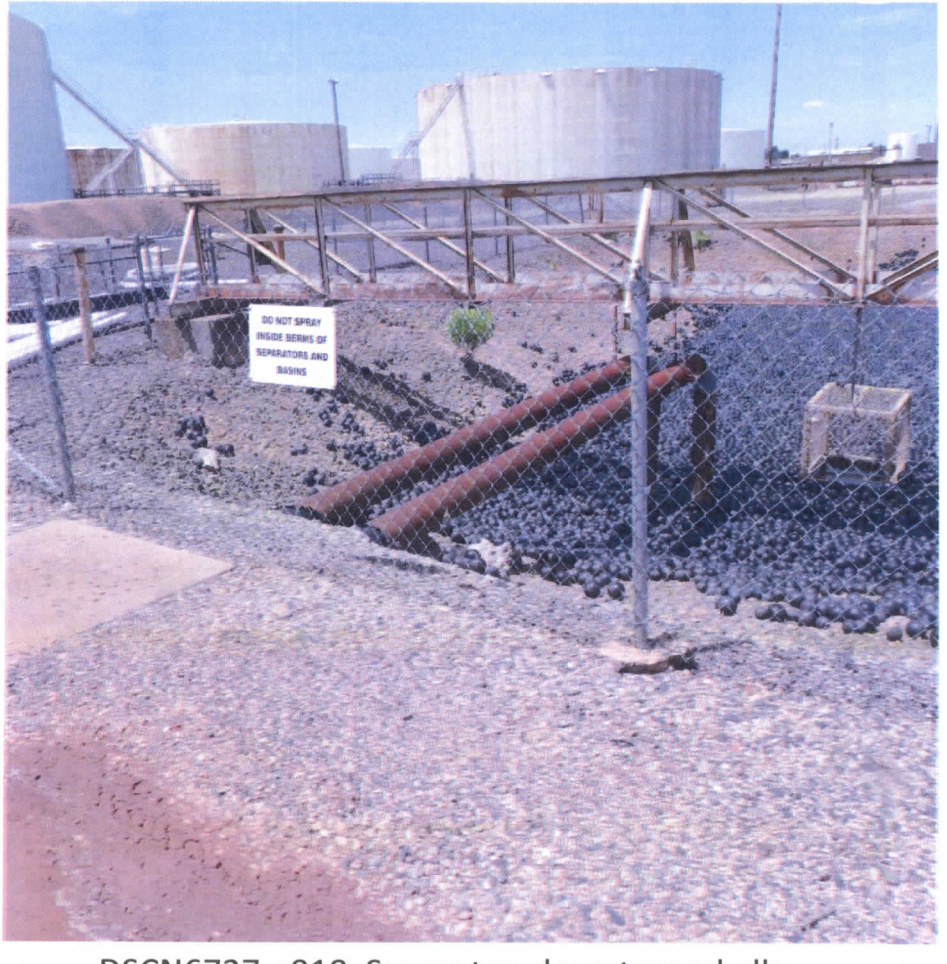
DSCN6722 – manhole that has had overflows that is on the way to the separator for the rail car unloading

DSCN6723 - manhole that has had overflows that is on the way to the separator for the rail car unloading

DSCN6724 – Separator unit for Oil/Water Separator

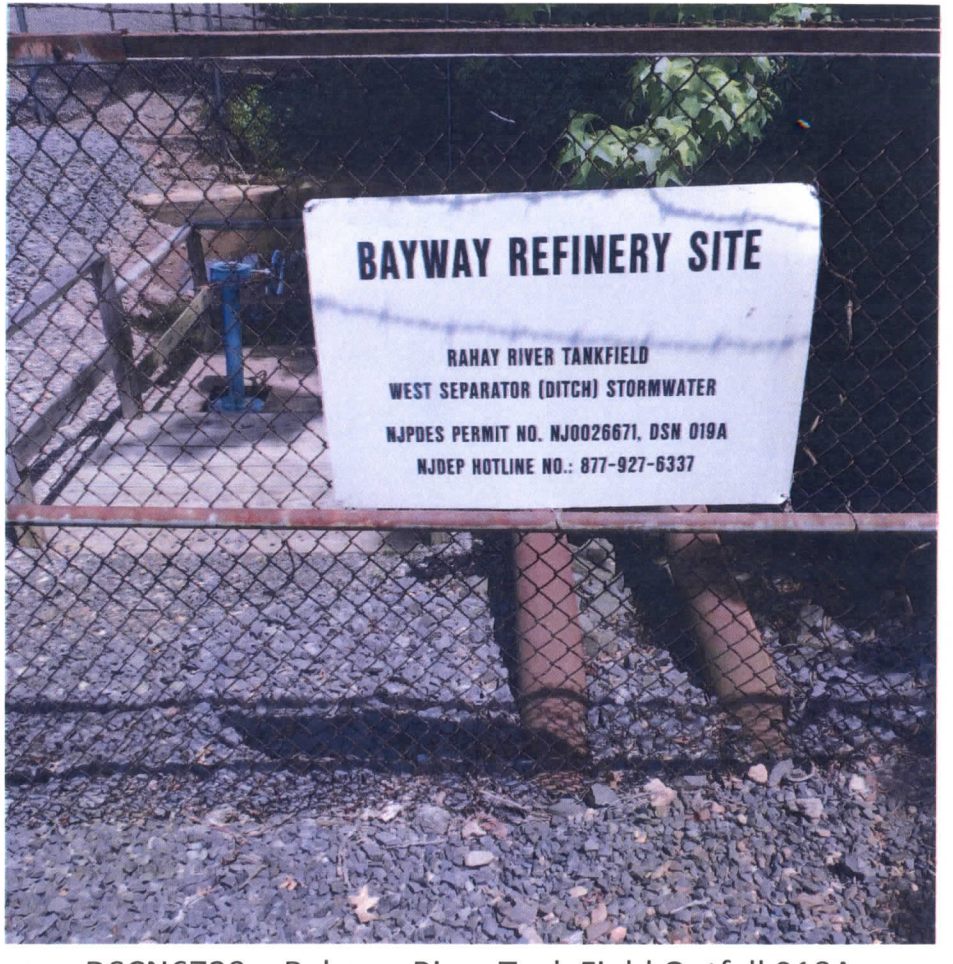
DSCN6725 – (Marked Outfall 015A but are referring to Outfall 018) Rahway River Tankfield Stormwater

DSCN6726 – 018 Separator, downturned elbows



DSCN6727 - 018 Separator, downturned elbows

DSCN6728 – Outfall 018A – No Sheens



DSCN6729 – Rahway River Tank Field Outfall 018A

DSCN6730 – Additive storage totes – temporary secondary containment had collapsed

DSCN6731 - Additive storage totes – temporary secondary containment had collapsed

DSCN6732 – Hazardous waste staging area dike. Puddling near dike valve.

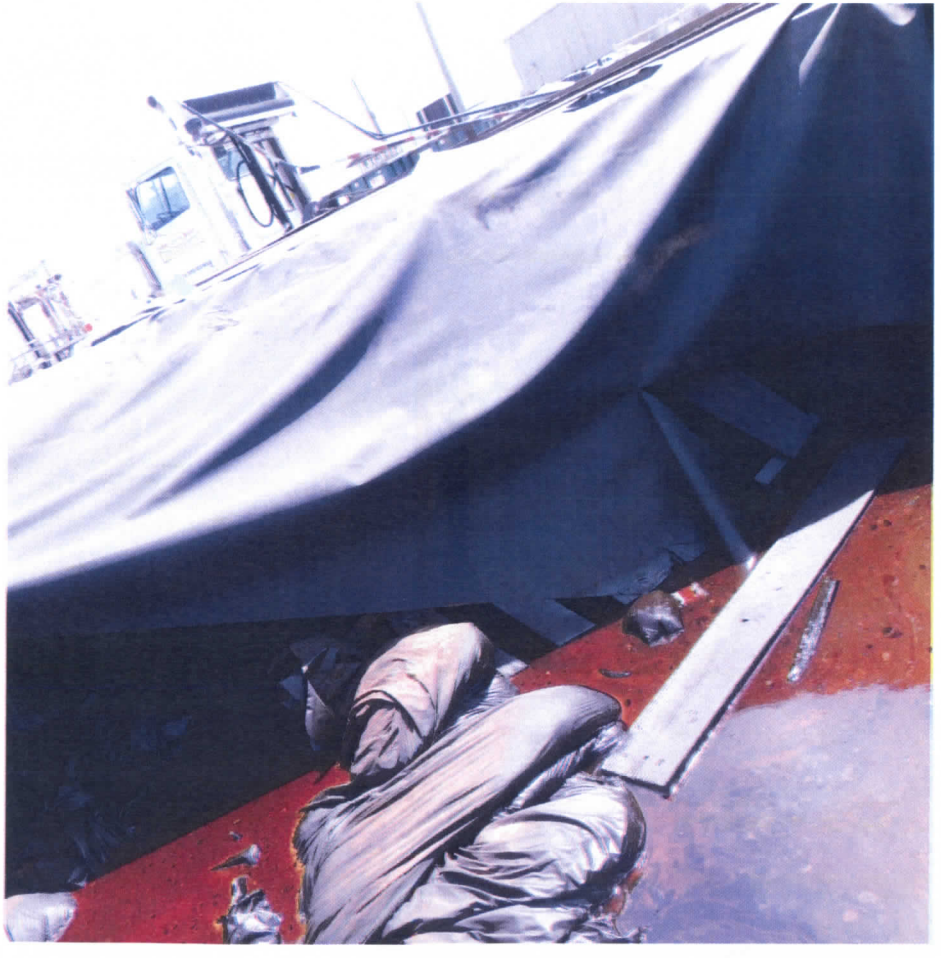
DSCN6733 – hazardous waste staging area and dike

DSCN6734 – hazardous waste storage area dike

DSCN6735 – Open dumpster in Exxon area.

DSCN6736 – drum storage in Exxon storage area

DSCN6737 – drum storage, hay bales in Exxon area.



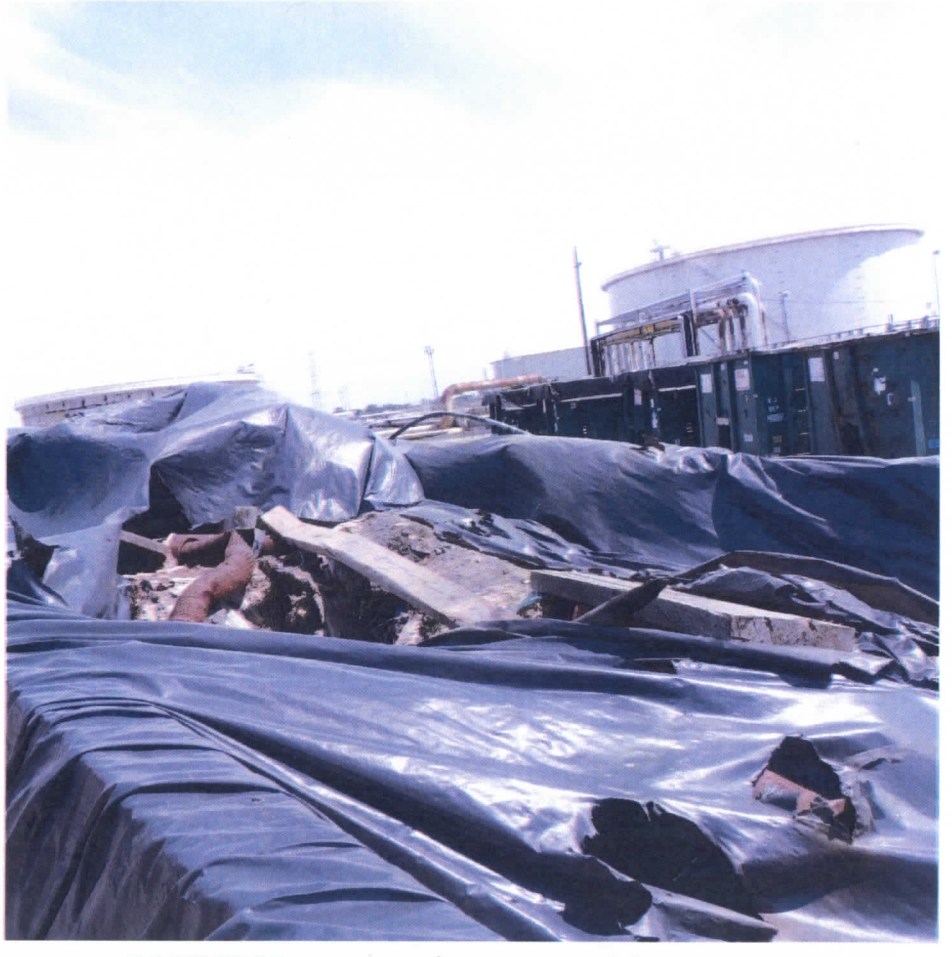
DSCN6738 – oily wastewater/stormwater in dumpster with cover partially off, dumpsters were leaking – Tank 519 Waste Mgmt. Area

DSCN6739 - oily wastewater/stormwater in dumpster with cover partially off, dumpsters were leaking - – Tank 519 Waste Mgmt. Area

DSCN6740 – hay and oily material outside of partially covered dumpster

DSCN6741 – leakage of oily material outside of dumpster with oily wastewater/stormwater outside of dumpster

DSCN6742 - leakage of oily material outside of dumpster with oily wastewater/stormwater outside of dumpster

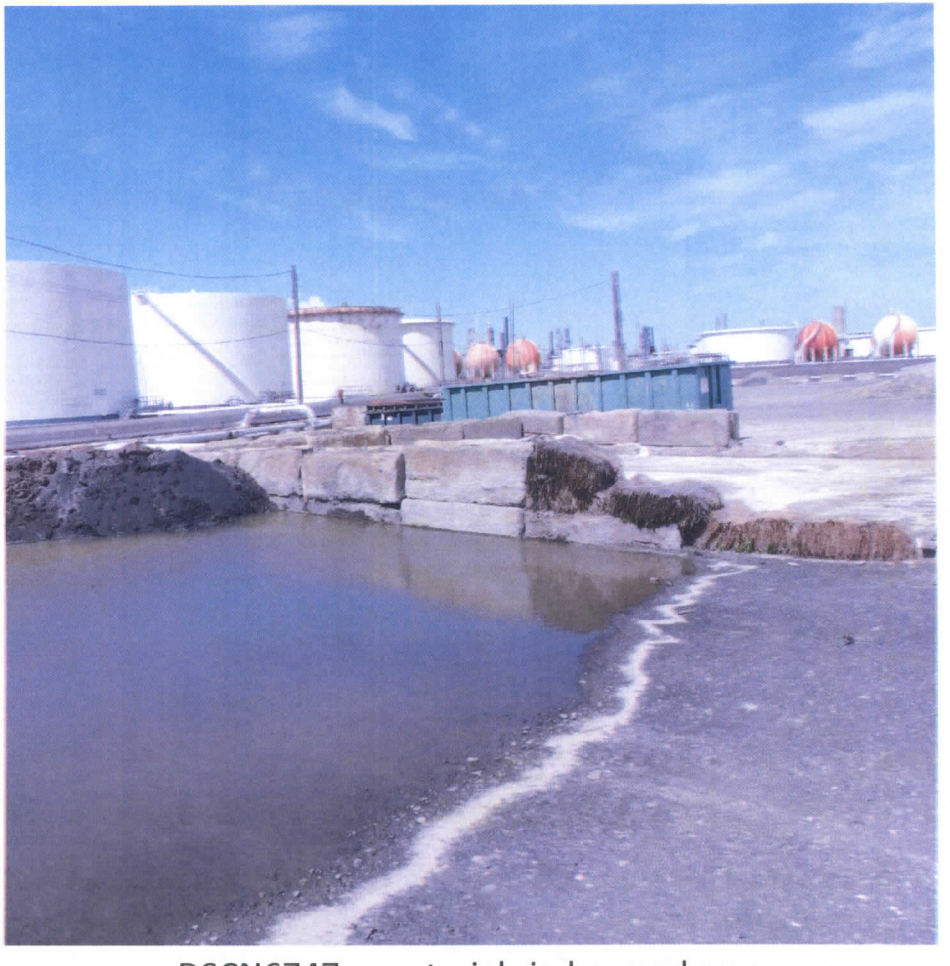


DSCN6743 – waste dumpster with torn cover

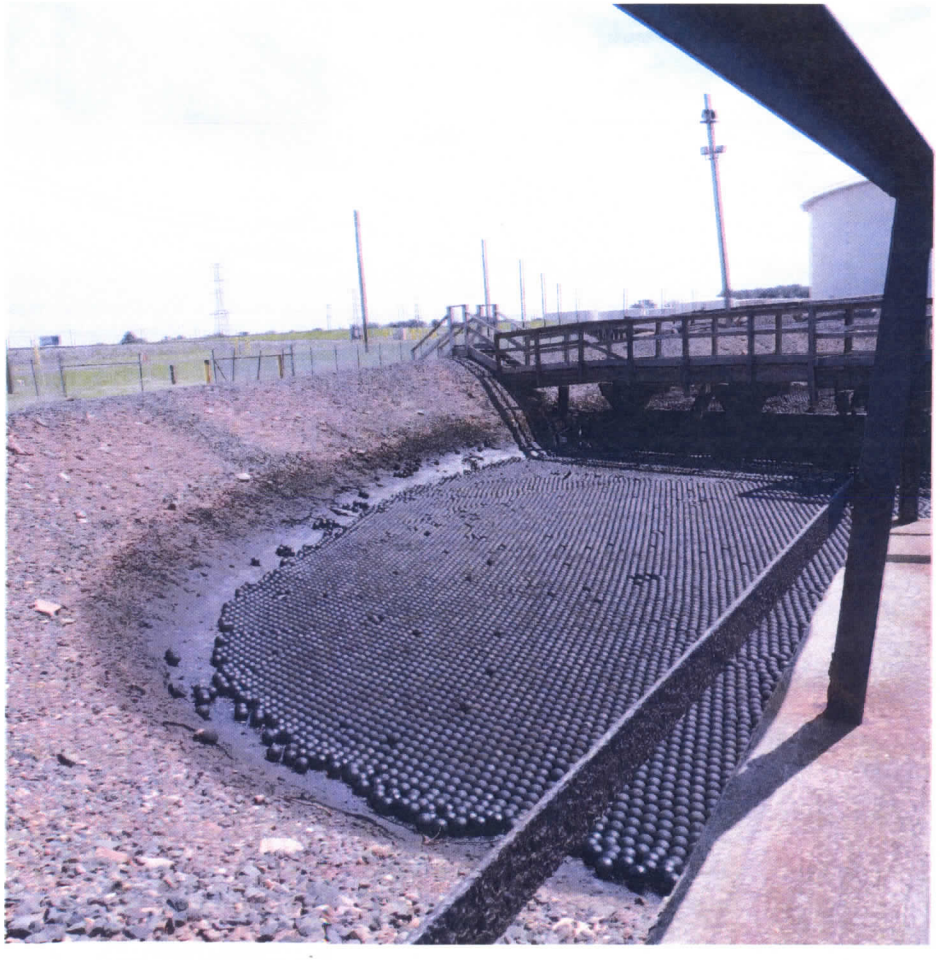
DSCN6744 – pellets outside of dumpster on ground in tank 519 waste area

DSCN6745 – puddle of water in the waste material dumpster area shown in the previous photos

DSCN6746 – Materials in bermed are



DSCN6747 – materials in bermed area



DSCN6748 - Tremley Tank Farm Outfall 010 separator, layer of floating oil seen in the separator and staining the banks

DSCN6749 – Tremley separator, Outfall 010, oily wastewater and oily boom/pig seen in the outlet chamber prior to the outlet valve

DSCN6750 - Tremley Tank Farm Outfall 010 separator, layer of floating oil seen in the separator and staining the banks

DSCN6752 - Tremley Tank Farm Outfall 010 separator, layer of floating oil seen in the separator and staining the banks

DSCN6753 – Outfall 010 channel near confluence with Morses Creek – no sheen seen

DSCN6754 – Exxon RCRA Area Land Farm unstabilized soils

DSCN6755 - Exxon RCRA Land Farm Area unstabilized soils

DSCN6756 - Exxon RCRA Land Farm Area - unstabilized soils, silt fencing in place.

DSCN6757 – Outfall 003 discharge area, booms in place, no sheens seen

DSCN6758 – 002 and 003 discharge free of sheens

DSCN6759 – oil was seen in the first part of the 003 separator.

DSCN6760 - oil was seen in the first part of the 003 separator

DSCN6761 – 002 and 003 discharge free of sheens

DSCN6762 – reservoir upstream of No. 2 Dam (Near Outfall 003)

DSCN6763 – diesel tank dike accumulated stormwater tributary to Outfall 007 – no sheen.

Att. 1b Bayway Refinery June 13, 2019

DSCN6765 – covered salt pile at the Linden Truck Loading Terminal

DSCN6766 - covered salt pile at the Linden Truck Loading Terminal

DSCN6767 – WWTP influent channel

DSCN6768 – WWTP influent

DSCN6769 – influent channel bypass is blocked off. Some flood control walls seen in place, additional portable dikes can be put in place.

DSCN6770 – oil on top of Infineum API separator

DSCN6771 – Vacuum truck skimming oil off of Infineum API Separator

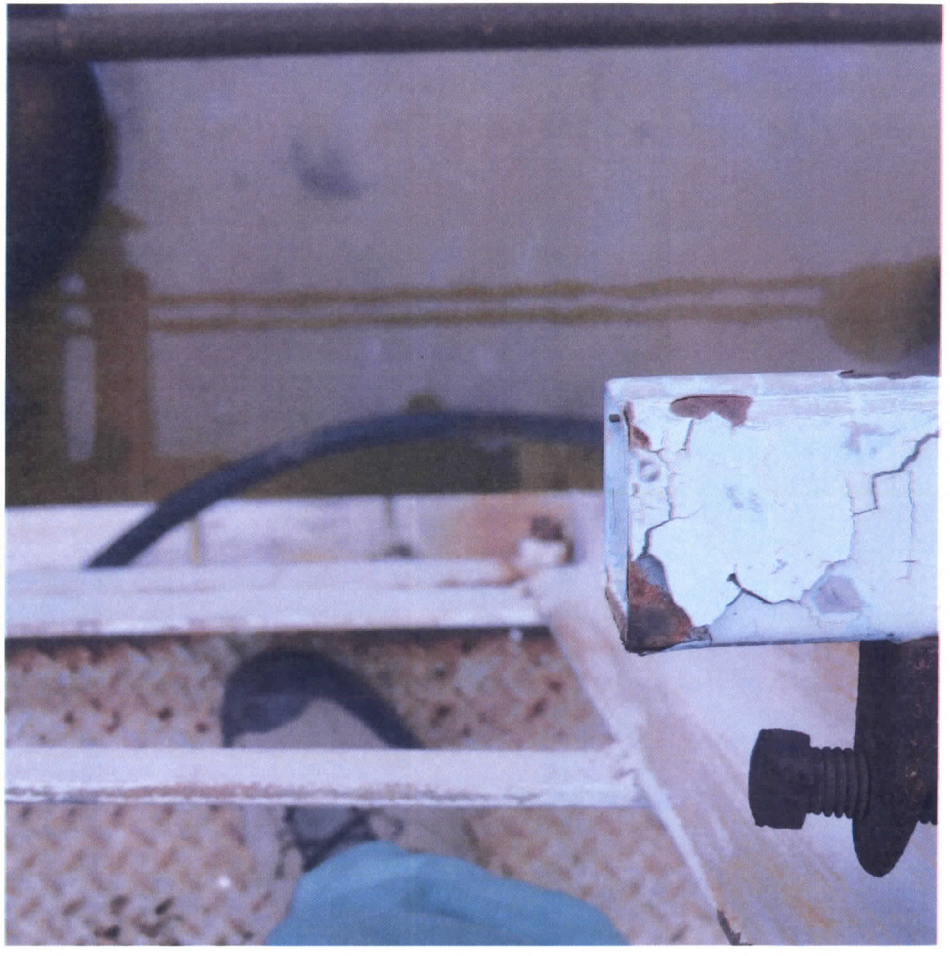
DSCN6772 – Infineum API separator

DSCN6773 –

DSCN6774 – sludge dewatering operation

DSCN6775 – oily water in the tank 133 tank dike

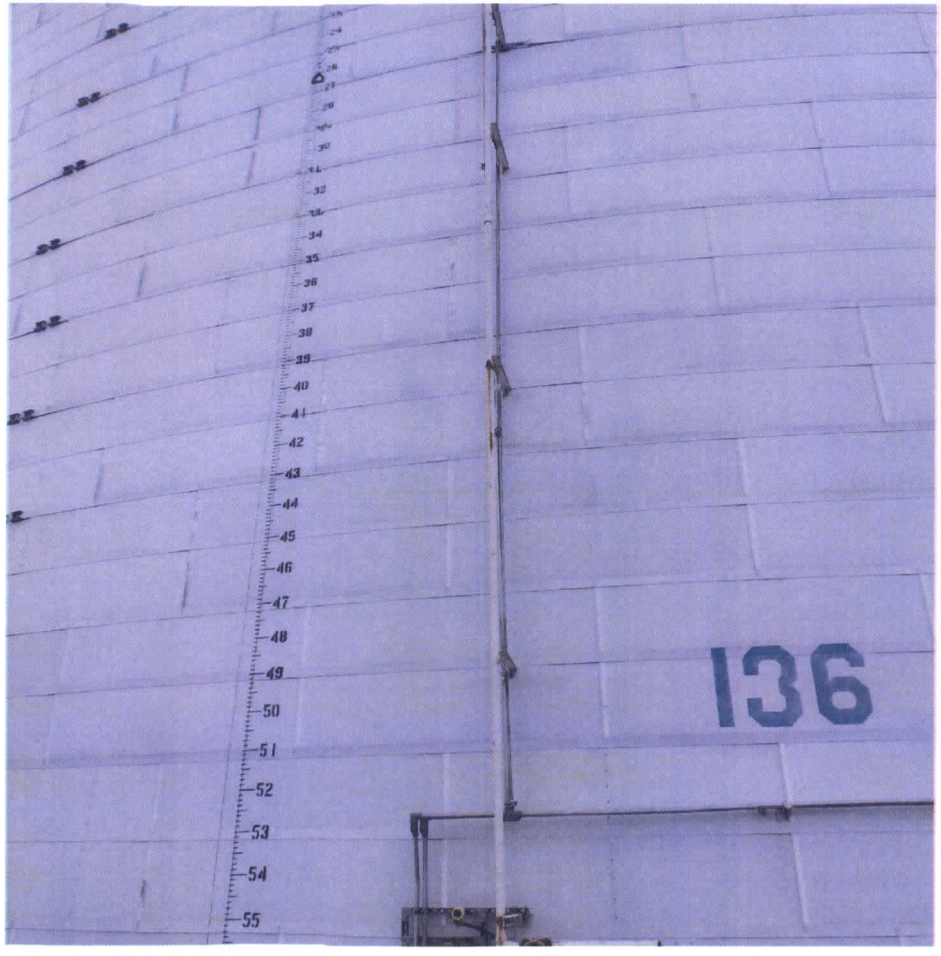
DSCN6776 - oily water in the tank 133 tank dike



DSCN6777 – sheen on tank 133 dike

DSCN6778 – Valve Break on the tank 133/132 dike, and said valve in open position

DSCN6779 - Valve Break on the tank 133/132 dike, and said valve in open position



DSCN6780 – Tank 136 wastewater equalization tank prior to the Bi-Ox lagoons

DSCN6781 - Tank 136 wastewater equalization tank prior to the Bi-Ox lagoons

DSCN6782 – Aerated Lagoons (Biological Oxidation (Bi-Ox Lagoons)

DSCN6783 – temporary piping setup for Return Activated Sludge (RAS)

DSCN6784 – Foaming at BiOx Lagoon

DSCN6785 - Foaming at BiOx Lagoon

DSCN6786 – Operating surface aerators

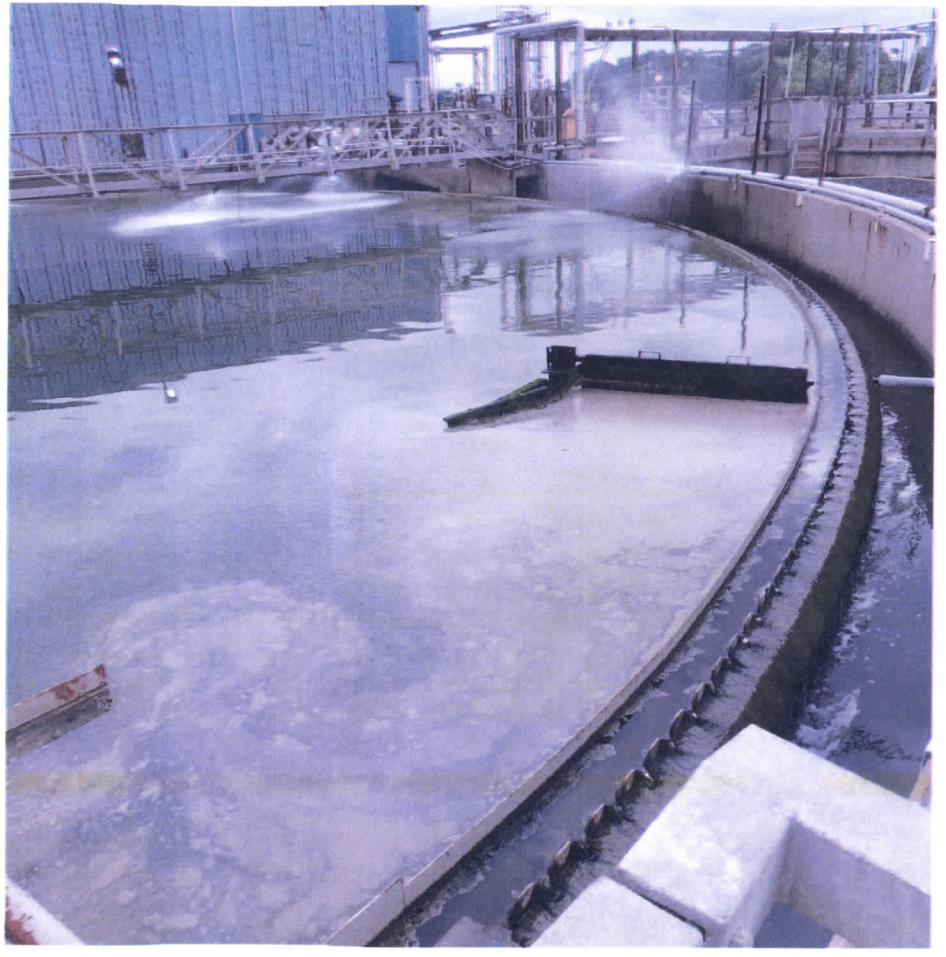
DSCN6787 – floating solids/foam near the Biox effluent

DSCN6788 – BiOx Lagoon effluent

DSCN6789 - BiOx Lagoon effluent

DSCN6790 – Diesel pumps set up for pumping Return Activated Sludge

DSCN6791 – eroded section of lagoon dike due to a pipe break

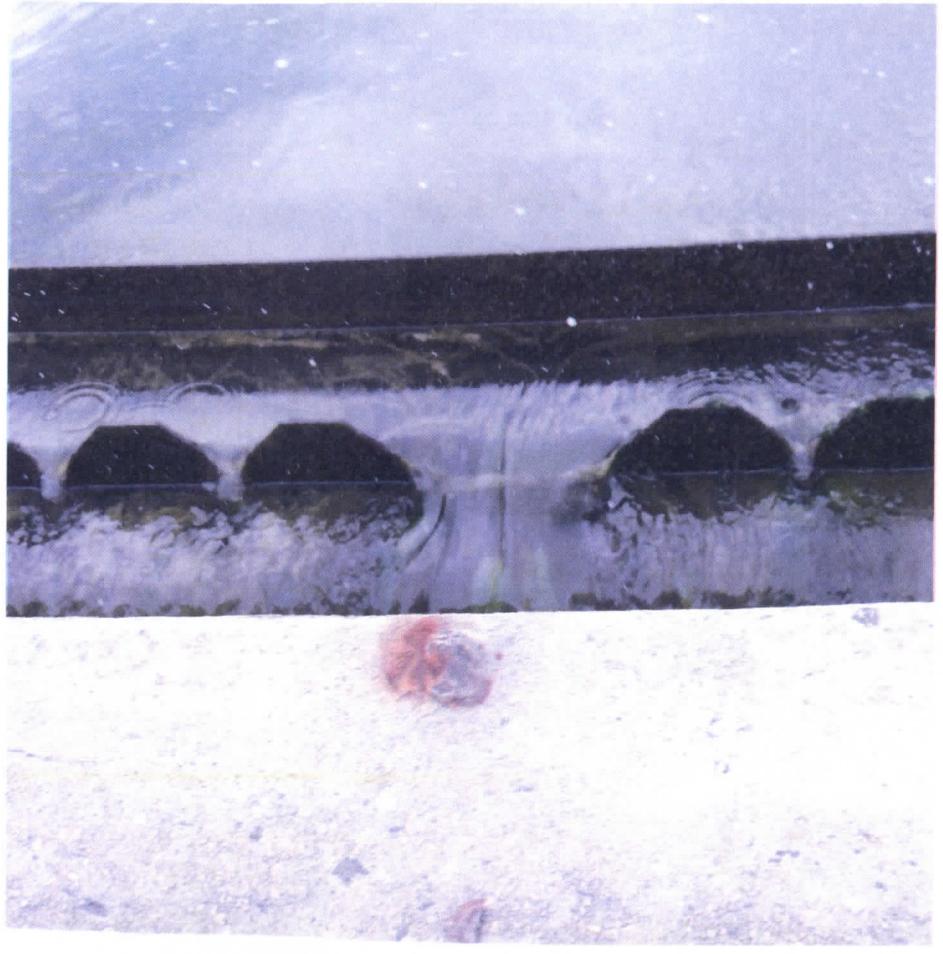


DSCN6792 – scum collection rake. Water sprays are seen on the clarifier

DSCN6793 – scum being collected in the final clarifiers

DSCN6795 – scum being collected at “beach” in the final clarifier

DSCN6796 – – scum being collected at “beach” in the final clarifier



DSCN6797 – missing a weir plate in the final clarifier No. 1

DSCN6798 – Final Clarifier No. 3 is down for maintenance

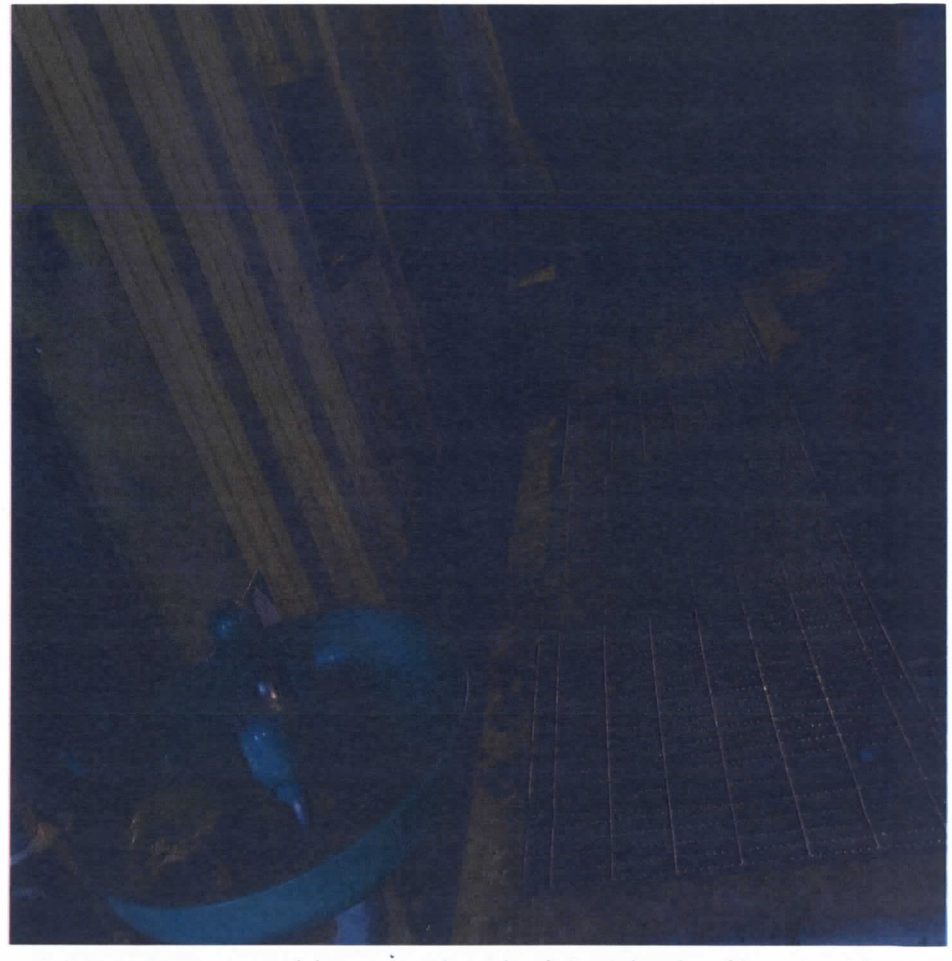
DSCN6799 – Final Clarifier No. 3 down for maintenance

DSCN6800 – water from a broken potable water line puddling outside of filter building

DSCN6801 - water from a broken potable water line puddling outside of filter building

DSCN6802 - water from a broken potable water line puddling outside of filter building

DSCN6803 – potable water line leak inside the filter building



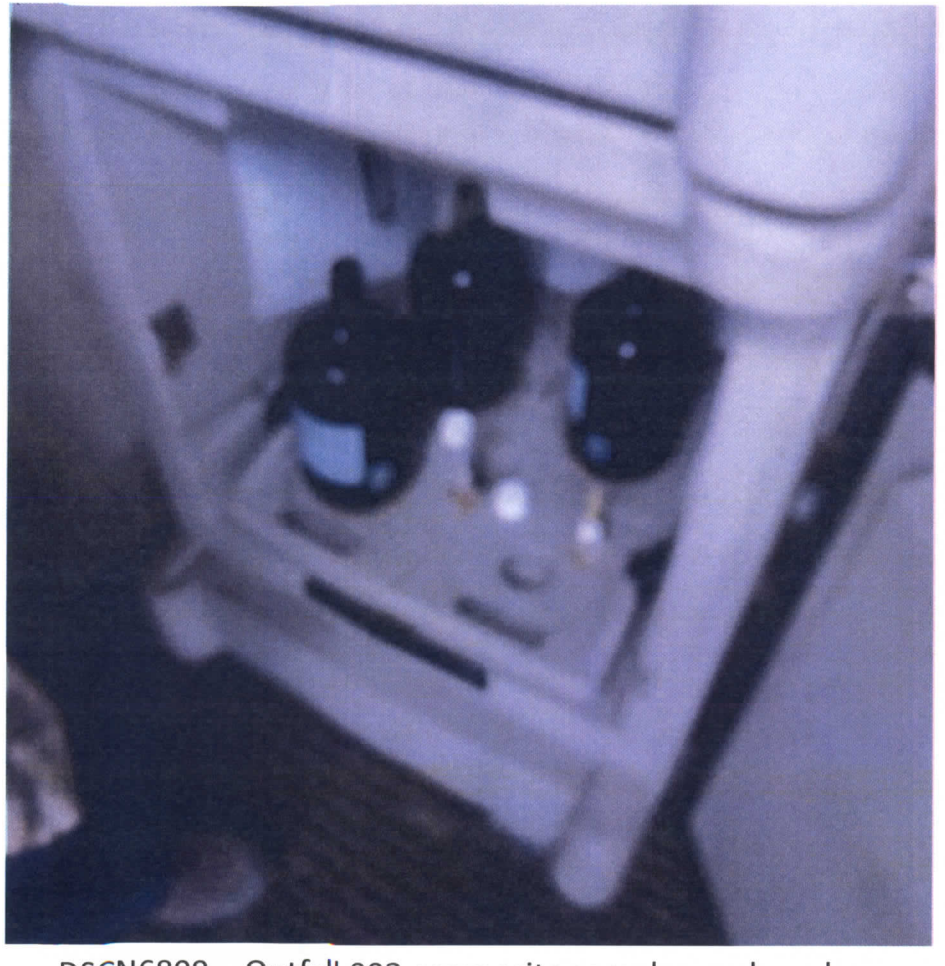
DSCN6804 – potable water line leak inside the filter building

DSCN6805 – leaking gate valve associated with filter

DSCN6806 - – leaking gate valve associated with filter

DSCN6807 – Parshall Flume at the WWTP Effluent Outfall 002

DSCN6808 – Outfall 002 Parshall Flume



DSCN6809 – Outfall 002 composite sampler, amber glass bottles for organics, had Teflon tubing as well.

DSCN6810 – unstabilized soils along the bank near pipeline in vicinity of WWTP effluent – Outfall 002

DSCN6811 - unstabilized soils along the bank near pipeline in vicinity of WWTP effluent – Outfall 002

DSCN6812 - unstabilized soils along the bank near pipeline in vicinity of WWTP effluent – Outfall 002

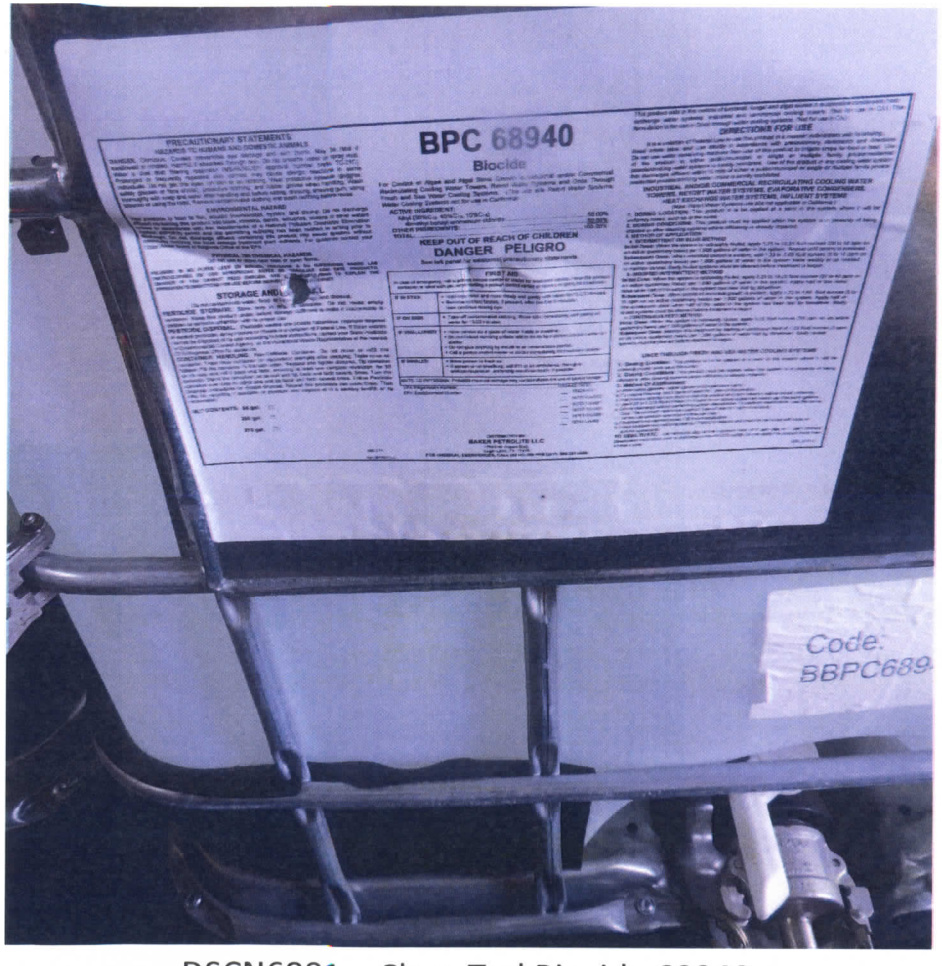
Att. 1c Photographs
Phillips 66, Bayway Refinery, Linden NJ, June 20, 2019
Unedited Digital Photos Taken by
Murray Lantner, P.E., Env. Eng
EPA Region 2, ECAD-WCB
Nikon Coolpix P510 Digital Camera

DSCN6877 – impinged shellfish collected in crate next to Arthur Kill pump house screens

DSCN6878 – foaming at intake on the plant side of the intake screen during feeding of Clam-Trol

DSCN6879 – Arthur Kill

DSCN6880 - Clam Trol Biocide BPC 68940

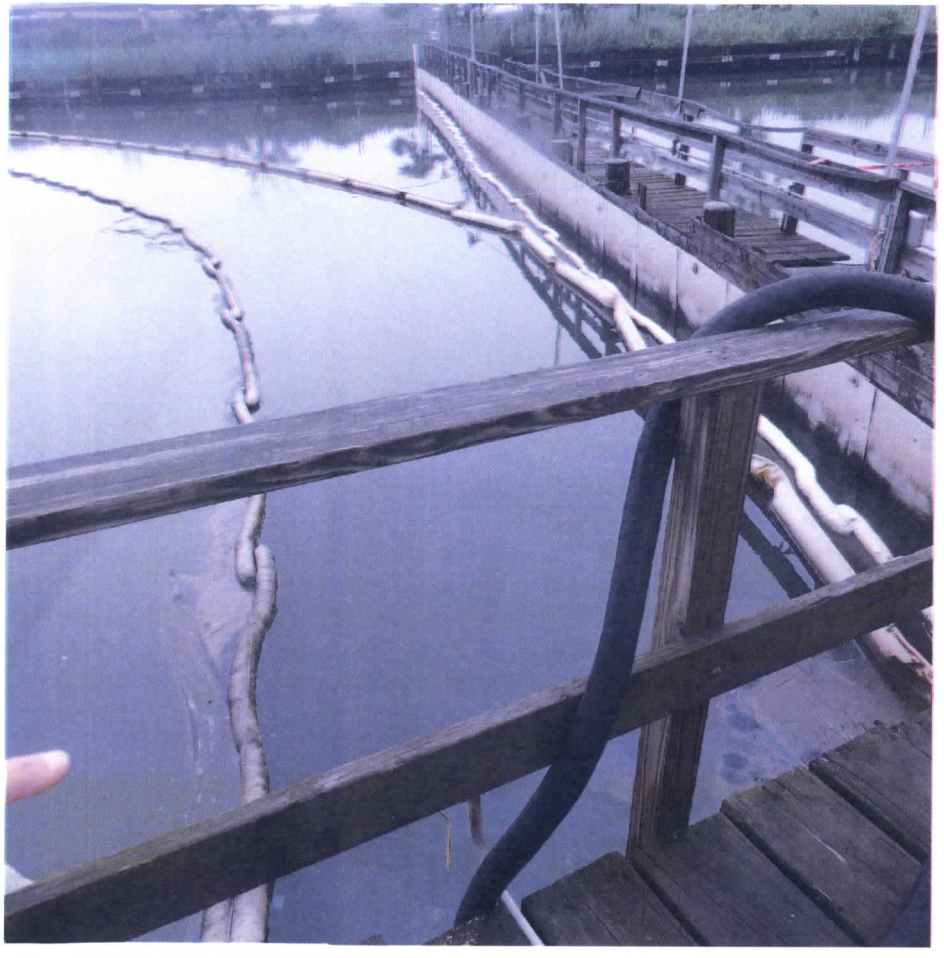


DSCN6881 – Clam-Trol Biocide 68940

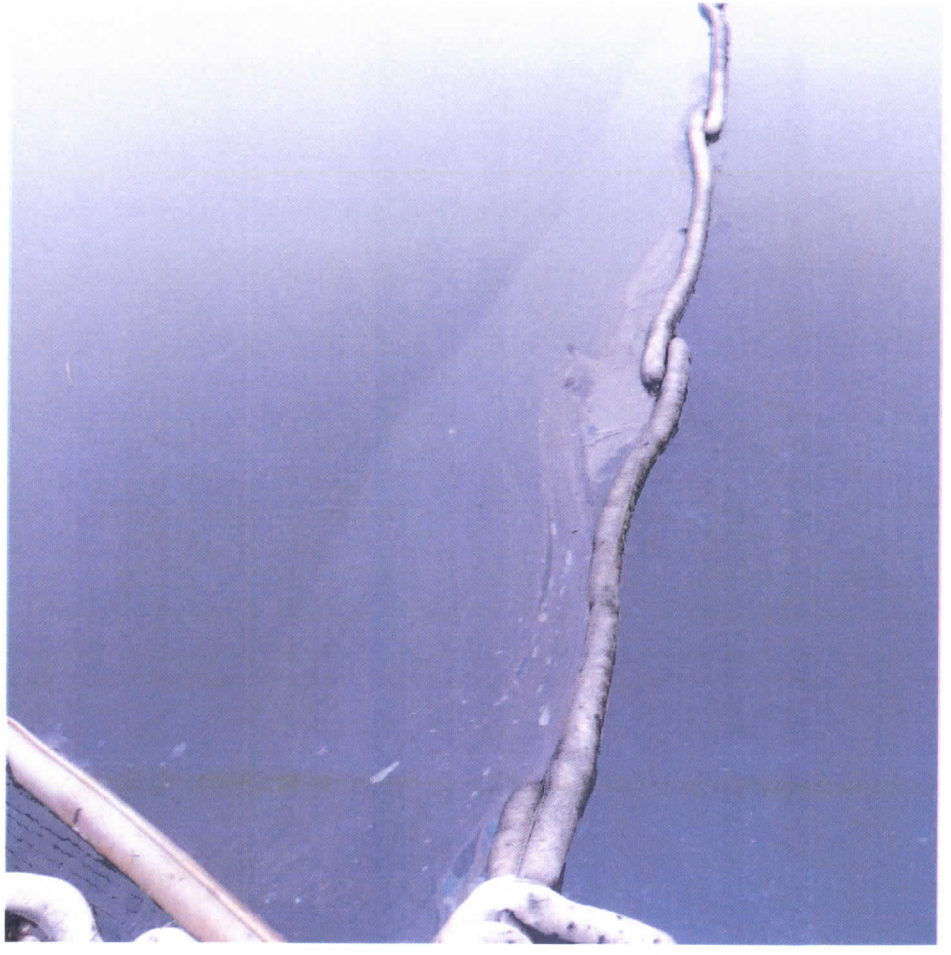
DSCN6882 – oil drums at Salt Water Intake Pump House

DSCN6883 – debris outside near intake Arthur Kill (Salt Water) Pump House

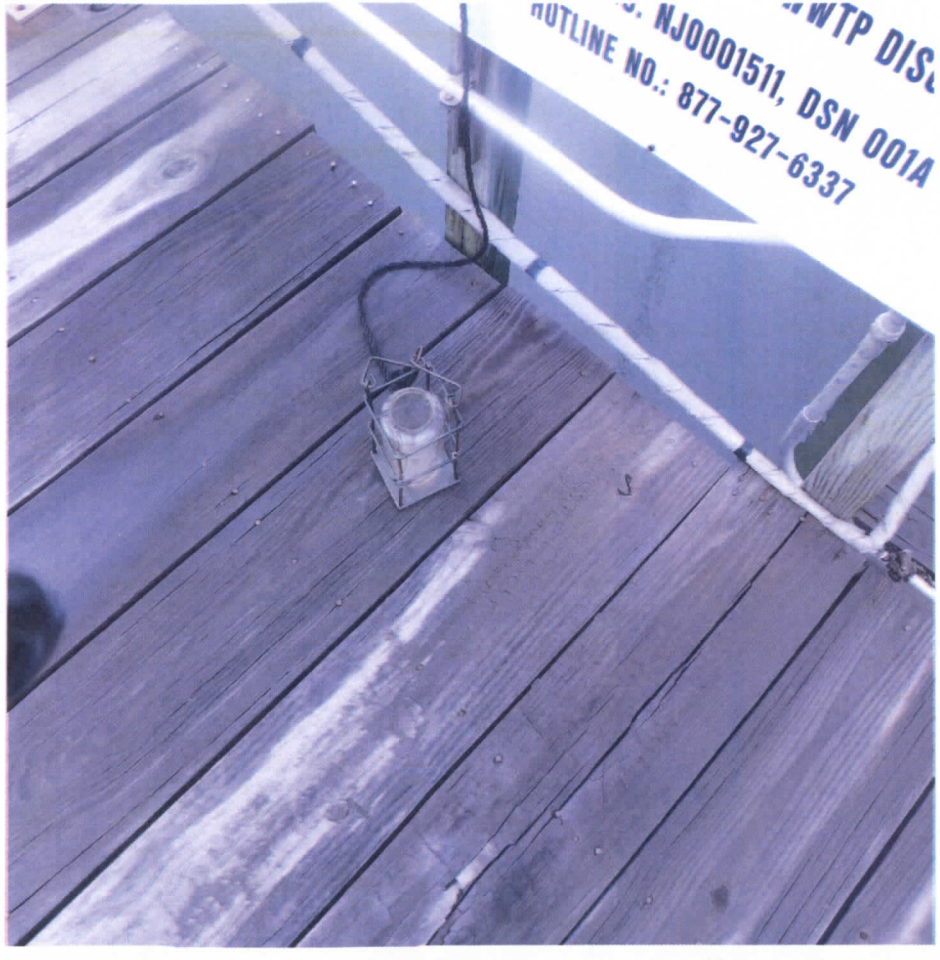
DSCN6884 – leach field for Arthur Kill (Salt Water) Pump House sanitary wastewater



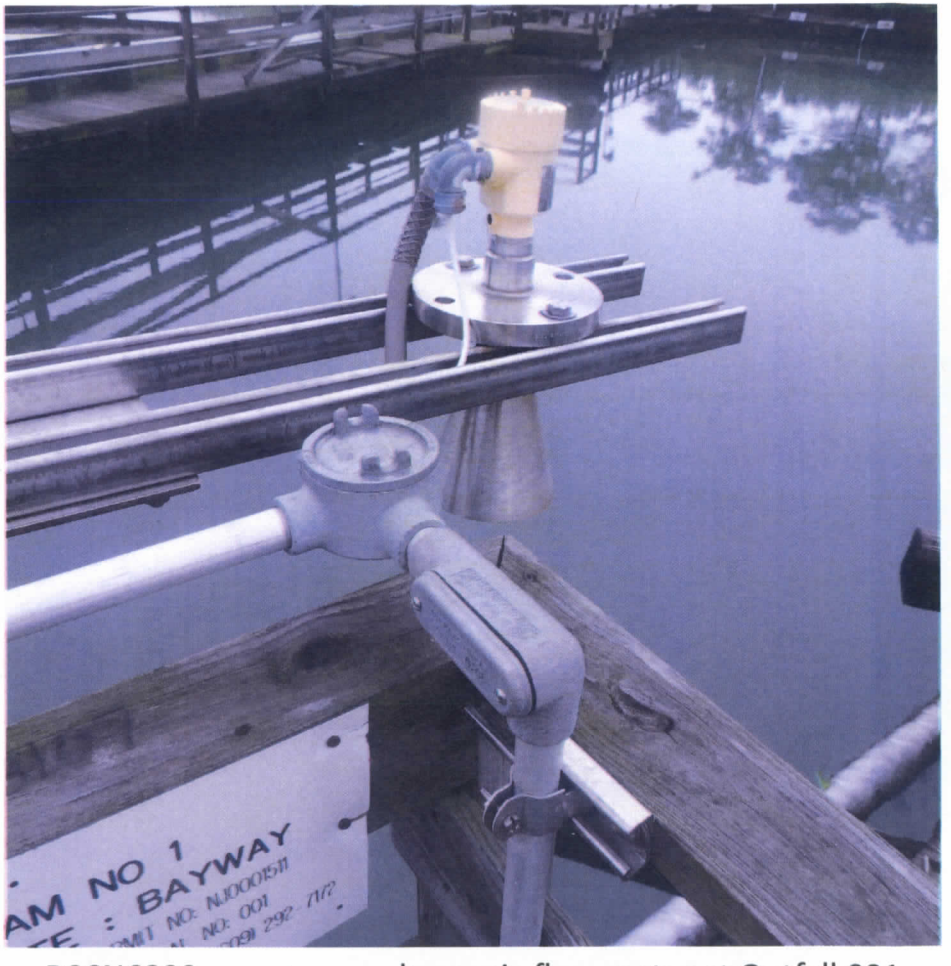
DSCN6887 – oil sheen on surface of water just prior to discharging thru the sorbent booms and underflow weir and prior to discharging from Outfall 001.



DSCN6888 - oil sheen on surface of water just prior to discharging thru the sorbent booms and underflow weir and prior to discharging from Outfall 001



DSCN6889 – glass jar for Oil and Grease grab samples at outfall 001



DSCN6890 – upstream ultrasonic flow meter at Outfall 001

DSCN6891 – upstream ultrasonic at Outfall 001 read 75.0 inches

DSCN6892 - Display for downstream ultrasonic flow meter at Outfall 001 – read 72.0

DSCN6893 – Ultrasonic flow meter on downstream side of underflow baffle at outfall 001

DSCN6894 – Outfall 005

DSCN6895 – outfall 005 – no sheen or foam

DSCN6896 – vacuum truck vacuuming up polypropylene pellets in a boomed area in the water near outfall 005

DSCN6897 – PE Pellets in the water and around shore in boomed area near at Outfall 005

DSCN6898 - vacuum truck vacuuming up PE pellets in a boomed area in the water near outfall 005

DSCN6899 - vacuum truck vacuuming up PE pellets in a boomed area in the water near outfall 005

DSCN6900

DSCN6901 – Polypropylene pellets on ground near polypropylene area.

DSCN6902 - Polypropylene pellens on ground near polypropylene area.

DSCN6903 - Polypropylene pellets on ground near polypropylene area.

DSCN6904 – effluent end of polypropylene area separator discharging floating pellets to Outfall 005

DSCN6905 - effluent end of polypropylene area separator discharging floating pellets to Outfall 005

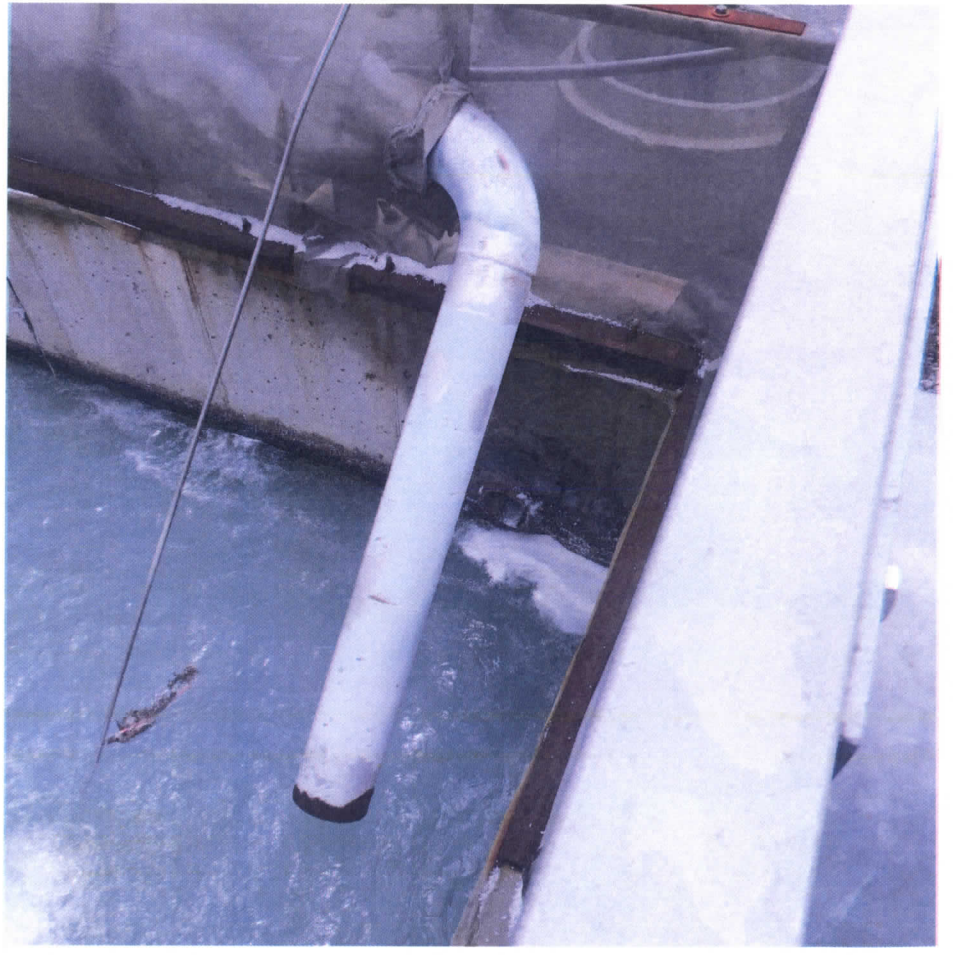
DSCN6906 - effluent end of polypropylene area separator discharging floating pellets to Outfall 005 – Outlet pipe cover not on outlet –but on wall.

DSCN6907 – floating material in polypropylene pellet separator – Pellets were being vacuumed off closer to the entry end of the separator

DSCN6908 - effluent end of polypropylene area separator discharging floating pellets to Outfall 005 - Outlet pipe cover not on outlet –but on wall.

DSCN6909 – Polypropylene pellets on ground in polypropylene area

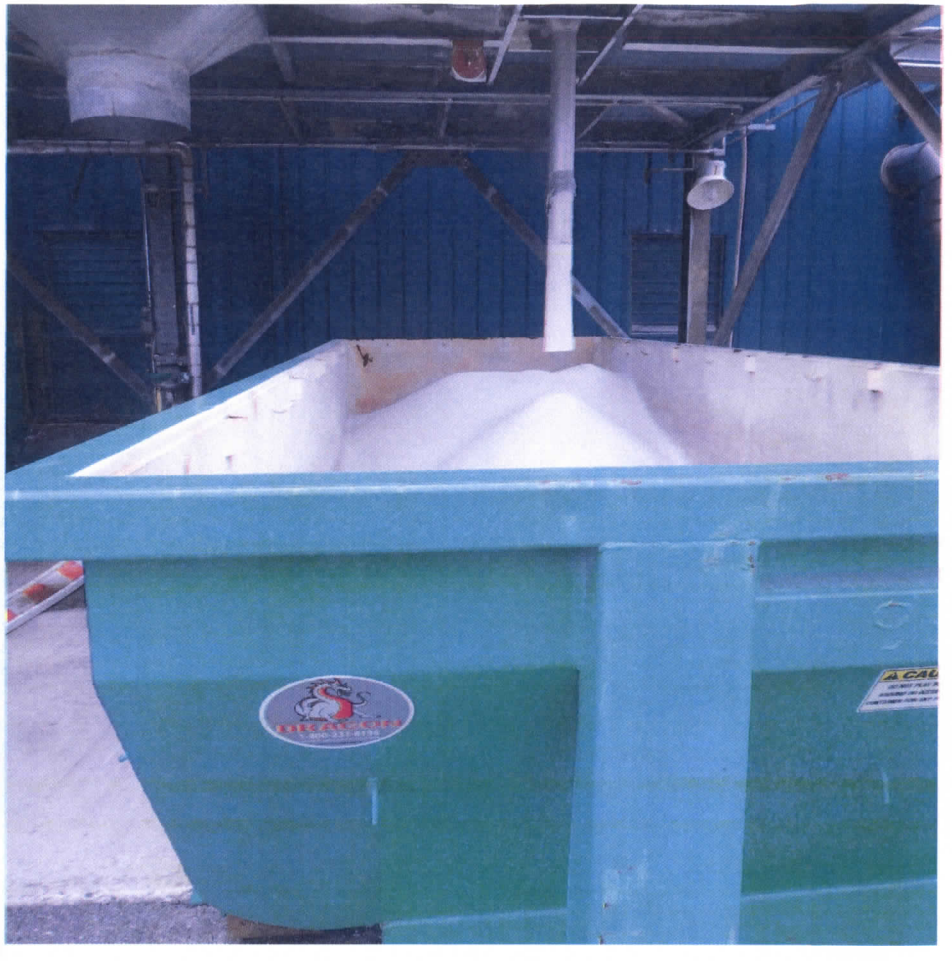
DSCN6910 – roll off that is sent to Cranberry Facility for recycling



DSCN6911 – entry end of polypropylene separator.

DSCN6912 – valve in polypropylene separator area.

DSCN6913 - open dumpster with Polypropylene baghouse waste that could be blown out of dumpster – not covered



DSCN6914 – open dumpster with Polypropylene baghouse waste that could be blown out of dumpster – not covered

DSCN6915 – polypropylene baghouse dumpsters

DSCN6916 – polypropylene pellets on ground

DSCN6917 – polypropylene pellets/material on ground dumpsters

DSCN6918 – Open tote with waste material in Polypropylene area.

DSCN6919 - Polypropylene pellets on ground near air intake for Conditioner Unit

DSCN6920 - Polypropylene pellets on ground near air intake for Conditioner Unit

DSCN6921 – Polypropylene pellets on ground near air intake for Conditioner Unit

DSCN6922 - Polypropylene pellets on ground near air intake for Conditioner Unit

DSCN6923 - Polypropylene pellets on ground
near air intake for Conditioner Unit

DSCN6924 – PP Separator

DSCN6925

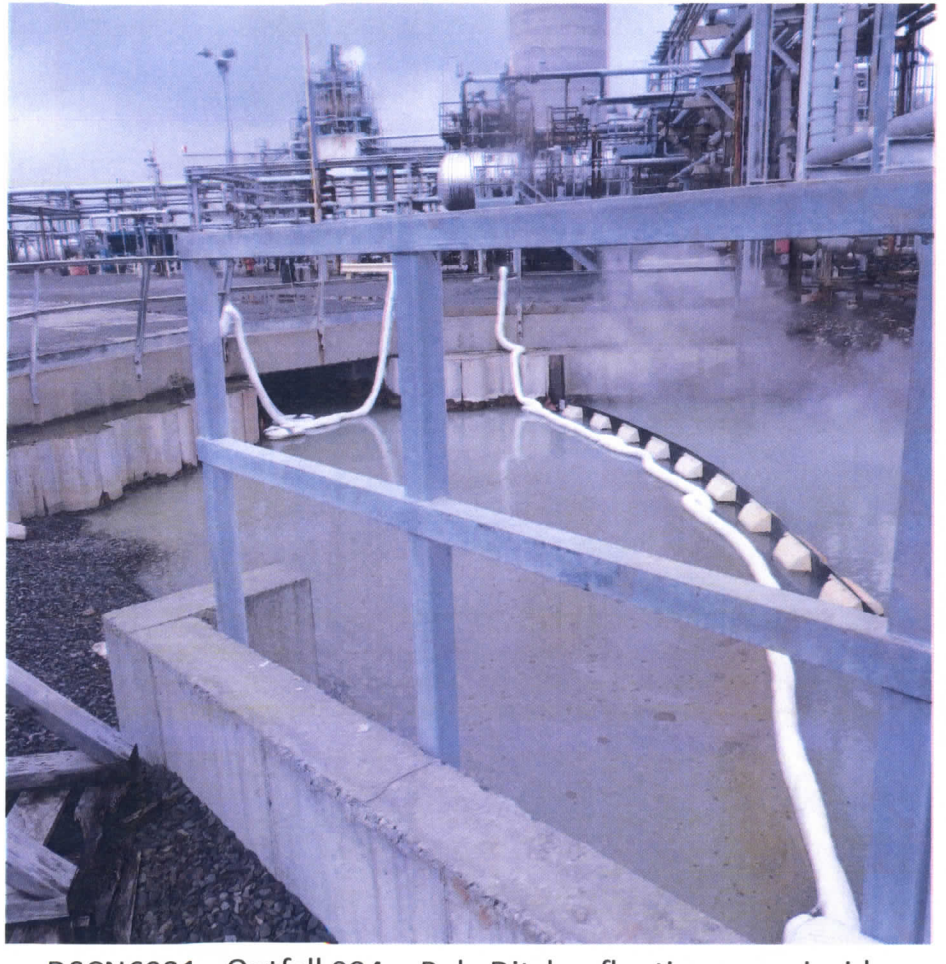
DSCN6926

DSCN6927 – Overflow of ISO Unit onto ground – said that it flows to the process sewer

DSCN6928 - Overflow of ISO Unit onto ground – said that it flows to the process sewer

DSCN6929 – Outfall 004 – Poly Ditch – floating scum inside boom at outfall.

DSCN6930 - Outfall 004 – Poly Ditch – floating scum inside boom at outfall.



DSCN6931 - Outfall 004 – Poly Ditch – floating scum inside boom at outfall.

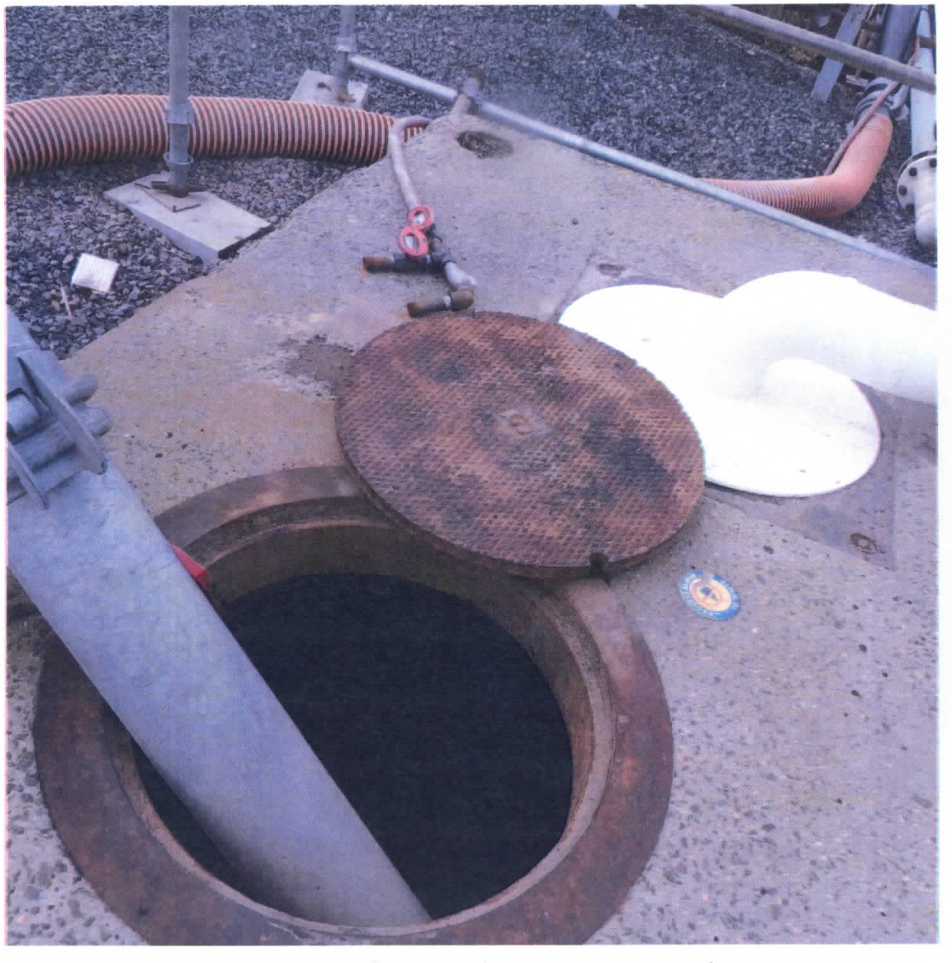
DSCN6932 - Outfall 004 – Poly Ditch Outfall – across black (approximately 12" pipe seen) – said to be used for adding additional cooling water to the channel.

DSCN6934 – Diesel Pump to control process wastewater overflows from Infineum Process sewer

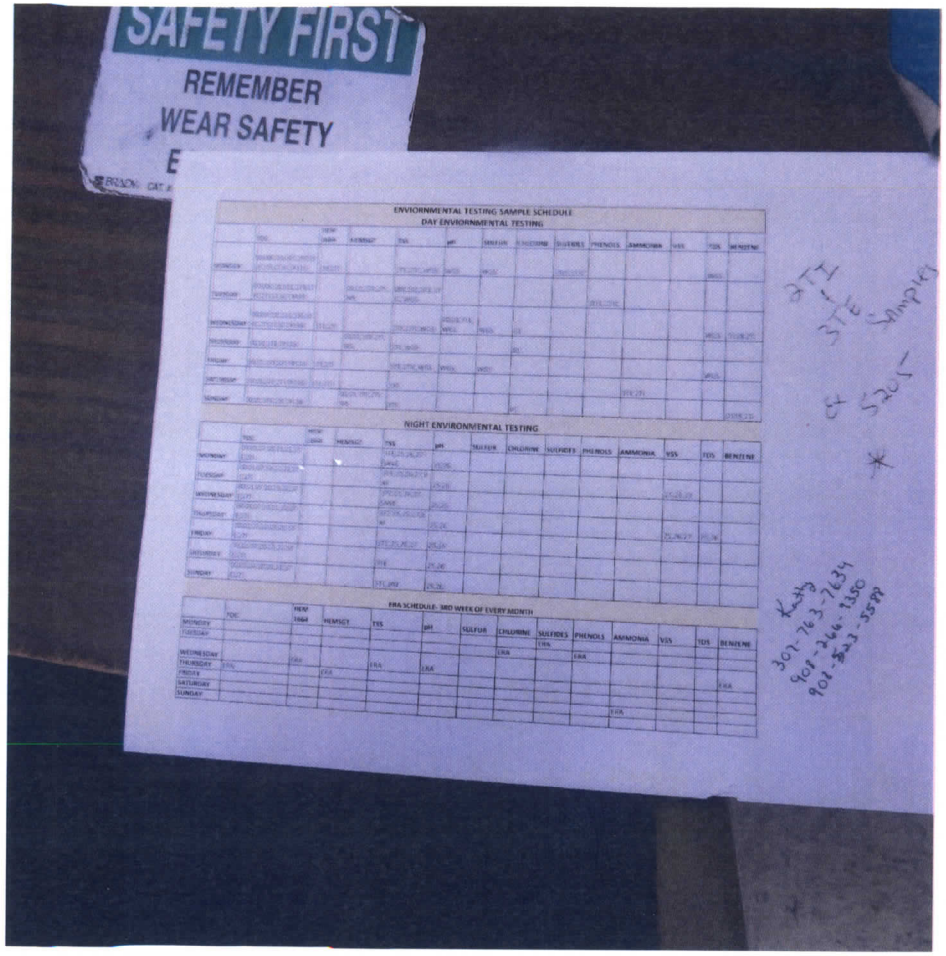
DSCN6935 - Diesel Pump hoses to control process wastewater overflows from Infineum Process sewer

DSCN6936 – flow entering area near diesel pump for Infineum Process Sewer Overflows

DSCN6937 - Diesel Pump hoses to control process wastewater overflows from Infineum Process sewer



DSCN6938 - Diesel Pump hoses to control process wastewater overflows from Infineum Process sewer



DSCN6939 – sampling schedule

Att. 2

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Surface Water Permitting

FACT SHEET

Masterfile #: 962 **PI #:** 46318

This fact sheet sets forth the principle facts and the significant factual, legal, and policy considerations examined during preparation of the draft permit. This action has been prepared in accordance with the New Jersey Water Pollution Control Act and its implementing regulations at N.J.A.C. 7:14A-1 et seq. - The New Jersey Pollutant Discharge Elimination System.

PERMIT ACTION: Surface Water Renewal Permit Action

1 Overview of Draft Renewal Permit:

The permittee has applied for a New Jersey Pollutant Discharge Elimination System (NJPDES) Surface Water Renewal Permit Action through an application dated October 27, 1997 with subsequent submittals dated August 8, 2000, September 28, 2006, and June 18-19, 2012. Until such time as this renewal permit is finalized, the existing permit remains in full force and effect pursuant to N.J.A.C. 7:14A-2.8.

This draft permit renewal proposes to authorize the discharge of wastewater and stormwater to Morses Creek. This includes regulation of outfalls previously regulated as well as outfalls that are newly regulated. This draft permit renewal also incorporates the New Jersey Department of Environmental Protection's (hereafter "the Department") determination with respect to the permittee's request for a thermal variance from surface water quality standards (NJSWQS) for heat and temperature pursuant to Section 316(a) of the Federal Clean Water Act as well as a determination pursuant to Section 316(b) of the Clean Water Act.

This fact sheet contains information organized into the following sections:

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Attachments to Fact Sheet

USGS Map
Schematic of Water Discharges between Dam No.2 and Dam No. 1
Schematic of Wastewater Sampling Points
Schematic of Morses Creek
Schematic of Water Flow

2 Name and Address of the Applicant:

Phillips 66 Company
1400 Park Avenue
Linden, NJ 07036

3 Name and Address of the Facility/Site:

Phillips 66 Company
1400 Park Avenue
Linden City, Union County

4 Discharge Location Information:

A copy of the appropriate section of a USGS quadrangle map indicating the location of the facility and discharge points is included towards the end of this Fact Sheet.

Outfall Designator: 001A Discharge at Morses Creek Dam No. 1

General Information		Watershed Information	
Receiving Water:	Arthur Kill	Downstream Confluences:	Arthur Kill
Via :	Dam Overflow	Receiving River Basin:	Passaic, Hackensack, NY Harbor Complex
Classification:	SE3	WMA (a):	07
Latitude:	40° 38' 03.3"	Watershed:	Elizabeth, Rahway, Woodbridge
Longitude:	74° 12' 20.8"	Subwatershed:	Morses Creek/Piles Creek
County:	Union	HUC 14 (b):	02030104030010
Municipality:	Linden	303(d) Listings:	TDS, PCBs, Total Phosphorus, Mercury (Fish), Dieldrin, Chlordane, PAHs, Dioxin, DDE, DDD, DDT, Fecal Coliform, Hexachlorobenzene, Heptachlor epoxide
Outfall Description			
Outfall Configuration:	Dam	Submerged Pipe Characteristics:	Not Applicable

Outfall Designator: 002A: Wastewater Treatment Plant

General Information		Watershed Information	
Receiving Water:	Morses Creek	Downstream Confluences:	Arthur Kill
Via :	Submerged Pipe	Receiving River Basin:	Passaic, Hackensack, NY Harbor Complex
Classification:	SE3	WMA (a):	07
Latitude:	40° 37' 45.3"	Watershed:	Elizabeth, Rahway, Woodbridge
Longitude:	74° 13' 31.4"	Subwatershed:	Morses Creek/Piles Creek
County:	Union	HUC 14 (b):	02030104030010
Municipality:	Linden	303(d) Listings:	TDS, PCBs, Total Phosphorus, Mercury (Fish), Dieldrin, Chlordane, PAHs, Dioxin, DDE, DDD, DDT, Fecal Coliform, Hexachlorobenzene, Heptachlor epoxide

Outfall Designator: 003A, 004A, 005A: NCCW Discharges

General Information		Watershed Information	
Receiving Water:	Morses Creek Between DSN 001A and DSN 002A	Downstream Confluences:	Arthur Kill
Via :	Pipe (003A) Ditch (004A, 005A)	Receiving River Basin:	Passaic, Hackensack, NY Harbor Complex
Classification:	SE3	WMA (a):	07
Latitude:	Below 40° 37' 45.3"	Watershed:	Elizabeth, Rahway, Woodbridge
Longitude:	Below 74° 13' 31.4"	Subwatershed:	Morses Creek/Piles Creek
County:	Union	HUC 14 (b):	02030104030010
Municipality:	Linden	303(d) Listings:	TDS, PCBs, Total Phosphorus, Mercury (Fish), Dieldrin, Chlordane, PAHs, Dioxin, DDE, DDD, DDT, Fecal Coliform, Hexachlorobenzene, Heptachlor epoxide

Footnotes:
(a) WMA = Watershed Management Area
(b) HUC 14 = 14 digit Hydrologic Unit Code

As noted in Section 3 above, subwatershed is impaired for TDS, PCBs, Total Phosphorus, Mercury (Fish), Dieldrin, Chlordane, PAHs, Dioxin, DDE, DDD, DDT, Fecal Coliform, Hexachlorobenzene, and Heptachlor epoxide. This permit requires the permittee to sample for the 209 PCB congeners and may require implementation of a PCB Pollutant Minimization Plan if determined necessary based on the sampling results at a later date. Total Phosphorus, TDS, and fecal coliform are not pollutants of concern at this facility. The remaining pollutants are required to be monitored as part of the WCR toxic pollutant monitoring requirements.

5 Facility Description:

The facility is classified as a major discharger by the Department in accordance with the United States Environmental Protection Agency (EPA) rating criteria. Based on available data, the facility's current estimated combined long-term average flow for DSN 001A is 159 million gallons per day (MGD) and is 9.01 MGD for DSN 002A. Three additional outfalls, DSN 003A, DSN 004A, and DSN 005A, are regulated for the first time in this renewal action. Operations at

the facility include petroleum refining (SIC 2911), manufacturing of lubricants (SIC 2992), site remediation activities, and the manufacture of industrial organic chemicals (SIC 2869).

Stormwater discharges from various outfalls are covered under the individual stormwater permit NJ0026671. If there are any questions regarding the NJPDES/DST permit, contact the Bureau of Nonpoint Pollution Control at (609) 633-7021.

Ground water discharges and in-ground tanks are covered under NJPDES permit number NJ0105104 and consist of process wastewater and stormwater from retention impoundments and in-ground tanks. If there are any questions regarding the NJPDES/DGW permit, contact the Bureau of Nonpoint Pollution Control at (609) 633-7021.

6 Description of Receiving Waters:

The facility has been in operation at its present location since 1909. Morses Creek, which is 1.7 miles long and 20 yards wide, flows directly through the facility. The facility maintains two dams on Morses Creek. Dam No. 1, the lower dam, is located 300 meters upstream of the confluence with the Arthur Kill. Dam No. 2, the upper dam, is located at the confluence of Peach Orchard Creek (Reservoir 1) with Morses Creek. Dam No. 2 is located in the western portion of the facility and is upstream of the bulk of the facility's processing areas. Dam No. 2 provides a boundary between Reservoir 1 and Morses Creek and therefore limits the natural freshwater flow from Reservoir 1 to Morses Creek. Morses Creek is classified as SE3 waters below Dam No. 2. Dam No. 1 is located downstream of the bulk of the facility's processing area and provides a downstream boundary of Morses Creek.

As Morses Creek flows downstream from Dam No. 2 there are several point source discharges directly into the creek via pipes as well as via drainage ditches. Significant ditches that flow into Morses Creek include Railroad Avenue Ditch and Poly Ditch. These ditches also have many point sources discharges directly going into them. The natural ebb tide flow is limited from the Arthur Kill into Morses Creek by Dam No. 1.

There are several schematics included at the end of the fact sheet to describe this layout.

7 Description of Wastewater Outfalls and On-Site Treatment:

The existing permit includes conditions for two primary wastewater outfalls, DSN 001A and DSN 002A. DSN 001A is an instream sampling point in Morses Creek before it flows into the Arthur Kill. Discharge components into Morses Creek upstream of the dam consist of non-contact cooling water, cooling tower blowdown, condensate, stormwater, steam trap condensate, firefighting equipment test waters, and treated wastewater that was discharged upstream at DSN 002A. DSN 002A is the discharge from the treatment plant and contains wastewater from the refinery process, the Infineum USA LP West Side Chemical Plant, analogous wastewater from other intra-state Phillips 66 facilities, and stormwater and groundwater from the site.

The treatment plant process consists of oil/water separation, neutralization, equalization, aerated activated sludge, clarification, and mixed media filtration. Sludge is thickened, and filter pressed before being managed at an approved residuals management site. The design capacity of the treatment plant is 15 MGD. A schematic of the facility's treatment is included near the end of the fact sheet.

Effluent Limitation Guidelines (ELGs) are applicable to this facility in accordance with *40 CFR 419.20* for Petroleum Refining (Subpart B: Cracking) and 40 CFR 414.90 for Organic, Chemical, Plastic, and Synthetic Fibers (OCPSF) (Subpart I: Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment). ELGs are applicable to the discharge from the wastewater treatment plant. Detailed ELG calculations are included at the end of this fact sheet.

The facility has three additional outfalls (1 pipe, 2 ditches) that are being newly regulated in this permit. These outfalls are designated as Railroad Avenue Ditch, Dam #2 Condenser Sewer, and Poly Ditch. All three of these outfalls consist primarily of a continuous flow of non-contact cooling water, but also consist of some steam trap condensate and

firefighting equipment test water. These three outfalls will be monitored in this renewal permit and will be identified as DSN 003A for the #2 Condenser Sewer outfall, DSN 004A for the Poly Ditch outfall, and DSN 005A for the Railroad Avenue Ditch outfall. Note that the Dam #2 Condenser Sewer outfall (DSN 003A) also contains stormwater from the DuPont SARs facility (discussed below), which is regulated separately before being commingled with the non-contact cooling water discharged through DSN 003A.

Dupont has constructed two sulfuric acid regeneration (SAR) units on the permittee's property. A wastewater discharge from the SAR units is sent to Phillip 66's on-site wastewater treatment plant and the estimated discharge rate of the discharge is 0.08 MGD. The permittee believes that this wastestream has contributed no new contaminants and that any flow increases are nominal. The stormwater from the SAR units is permitted via DuPont's General Permit No. NJ0088315 but then discharges into Bayway's stormwater sewers that drain to Morses Creek via the Dam #2 Condenser Sewer.

8 Description of Site-Specific Permitting Considerations and Section 316(a) Determination:

A. Regulatory Background to Sampling Location of Regulated Outfalls and Studies Conducted to Address Toxics

On December 1, 1989 Exxon (the permittee at that time) filed a petition requesting reclassification of Morses Creek, challenging the legality of any other classification than TW-4, established in 1975 by then DEP Commissioner Bardin. The designated uses of TW-4 waters were industrial and any other reasonable use. Exxon had specifically requested that a portion of Morses Creek between Dam Number 2 and the confluence with the Arthur Kill be reclassified with the TW-4 designation. The Department issued a decision on December 3, 1990 denying Exxon's request and maintained that Morses Creek is an SE3 classification. The continued SE3 classification for this surface water of the state provides for secondary contact recreation, maintenance and migration of fish populations, migration of diadromous fish, maintenance of wildlife and any other reasonable uses. Phillips 66 notes that security laws enacted after the Department's 1990 decision make secondary contact recreation unattainable as a designated use in Morses Creek as long as the facility remains in operation, whether or not the creek is dammed.

The Department's permitting goal is to ultimately regulate facility discharges so as to support all of the above designated uses in Morses Creek. As such, the existing NJPDES permit issued in March 1993 required the permittee to identify all point sources to Morses Creek and to perform effluent characterization studies. The Department stated the following in the draft permit with respect to this issue:

> Upon receipt of the effluent characterizations in the future, the permit may be reopened to incorporate appropriate limitations so as to assure compliance with the New Jersey Surface Water Quality Standards and other applicable requirements.

Further, with respect to DSN 001A, the draft permit stated the following:

> Based on the decision to deny the reclassification, DSN 001A is no longer an appropriate monitoring point to regulate wastewater emanating from the facility; and since no data exists for the individual point source discharges to Morses Creek, the Department has required that the applicant identify all discharges to Morses Creek between the two Dams and perform a waste characterization study for each ....Although the limitations are being rolled over from the previous permit, the Department does not agree that the allocations, limitations and monitoring location are appropriate to control the discharge of pollutants from the facility.

As noted above, in order to prepare for a change in location for monitoring, the existing 1993 permit required identification and characterization of all significant point sources to Morses Creek or to tributaries (i.e. ditches) to Morses Creek. Specifically, this permit continued regulation at DSN 001 and 002 at the previous sampling locations but also required the permittee to perform an effluent characterization study for three of the most significant wastewater sources, namely DSN 003A, 004A and 005A, to see if Water Quality Based Effluent Limitations (WQBELs) were warranted. This data was submitted in a study entitled "Final Report – Effluent Characterization Study, Chronic Toxicity Characterization Study", dated April 1994 and in a supplemental submittal dated February 29, 2000. A summary of this toxics data is included in the next section. The presence of toxics is being addressed via this renewal permit action.

B. Regulatory Background for Thermal Issues

The existing permit contains an effluent limitation of 95 degrees Fahrenheit at DSN 001 in accordance with N.J.A.C. 7:9B-1.14(d)11.iv. The New Jersey Surface Water Quality Standards (NJSWQS) at N.J.A.C. 7:9B-1.5(c).8.ii state the following with respect to thermal alterations outside of heat dissipation areas for SE waters:

> No thermal deviations which would cause temperatures to deviate more than 2.2°C (4°F) from September through May, nor more than 0.82°C (4°F) from June through August, nor cause temperatures to exceed 29.4°C (85° F).

In addition, N.J.A.C. 7:9B-1.5(h)2.i(1). states the following with respect to heat dissipation areas for streams:

> (i) Not more than one-quarter (1/4) of the cross section and/or volume of the water body at any time.
>
> (ii) Not more than two-thirds (2/3) of the surface from shore to shore at any time; and
>
> (iii) These limits may be exceeded by special permission, on a case-by-case basis, when a discharger can demonstrate that a larger heat dissipation area meets the tests for a waiver under Section 316 of the Federal Clean Water Act.

Section 316(a) of the Federal Clean Water Act states, in part:

> ....the Administrator (of if appropriate, the State) may impose an effluent limitation under such sections for such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on that body of water.

In sum, the Department can deviate from the above referenced thermal effluent criteria for point sources and the heat dissipation dimensions provided that the conditions of Section 316(a) of the Clean Water Act are met. In other words, a Section 316(a) determination would override the NJNJSWQS thermal criteria.

The permittee provided a study entitled "Intake and Thermal Discharge Studies" dated April 1995. Information included in this study with respect to the thermal issue is as follows:

C. Studies Conducted to Address Thermal Issues

- Alternatives to existing cooling water system operating processes, practices, and facilities which may have the potential to reduce impingement, entrainment, and/or thermal discharge.
- The age of the equipment and facilities involved with the permittee's cooling water system.
- Engineering specific aspects of each cooling water system's alternative, including impacts such as process changes, safety, product quality and reliability.
- The intake flow and discharge flow at each discharge and reductions in flows attainable with each cooling water alternative.
- The construction and operating costs of each cooling water system alternative.
- Non-water quality environmental impacts, including energy requirements, of each cooling water system alternative.

Thermal Discharge Mapping Study

For the purposes of the Section 316(a) Determination, the permittee considered the Arthur Kill as the receiving waterbody. Bayway summarizes the thermal discharge mapping study as follows:

- The Bayway thermal discharge, with excess temperatures above 1°C, has an effect only on the upper 2.5 meters of the 12 meter water column of the Arthur Kill.

- Bayway can meet thermal NJNJSWQS during the nine non-summer months of September through May, except for short duration tidal events in the warmer non-summer months. During the tidal stage "slack water before ebb tide", which occurs 1 to 2 hours per day, the spatial "2/3" criterion may be somewhat exceeded in the top 1 to 2 meters of the water column in the warmer months of September, October, or May.

- Bayway can meet the intent and purpose of the NJNJSWQS during the summer months of June, July and August. The 0.8°C excess temperature contour does extend entirely across the Arthur Kill during most tidal cycles but remains confined to the upper 2 to 3 meters of the water column, with the exception of the area that is very close to the mouth of Morses Creek, and is restricted to within the 25% criterion for the cross-section at all times.

- Bayway contends that the latest modeling and data gathering reaffirm the conclusions reached during the March 1980 modeling effort by Ichthyological Associates, Inc. That study concluded that the thermal discharge from Bayway Refinery will not jeopardize the maintenance or passage of the representative important species in the Arthur Kill, nor will the thermal discharge block the migration of anadromous fish or inhibit the localized movement of residential fish. The behavioral response and tolerance to thermal exposure by the representative important species indicates that these populations, and therefore the aquatic community as a whole, will not suffer adverse effects.

- Bayway requests a thermal variance from the NJNJSWQS under Section 316(a) of the Clean Water Act. This request considered the Arthur Kill to be the receiving water. As noted above, Bayway concludes that the thermal discharge from the facility assures the protection and propagation of a balanced indigenous population in the Arthur Kill.

Cooling System Alternatives Study

Bayway also submitted a Cooling System Alternatives Study which evaluated four indirect and seven direct cooling technologies to determine if economically feasible alternatives exist to reduce the heat load currently discharged with the once-through non-contact cooling water discharged by Bayway. Indirect cooling methods include passive cooling systems used to minimize the amount of heat rejected to the non-contact cooling water and include the following four methods evaluated in this report: 1) waste heat recovery from process streams; 2) improved energy efficiency in refinery process units; 3) replacement of water cooled heat exchangers with air cooled heat exchangers; and 4) use of a tempered water system. Direct cooling technologies include cooling towers where seven different configurations were evaluated in this report.

The Cooling System Alternatives Study findings as contended by Bayway can be summarized as follows:

- The Department determined in the 1993 permit that the facility's once through cooling non-contact cooling water system was the Best Available Technology Economically Achievable (BATEA) for the control of thermal discharge.

- The refinery currently recovers waste heat from the process streams to the maximum extent practicable. Accordingly, enhanced heat recovery is not economically or technically viable as a means to appreciably reduce the heat load. The refinery's energy utilization is extremely efficient and has limited scope for improvement. The Bayway Refinery is a 2012 Energy Star Certified Facility.

- None of the four indirect cooling methods reviewed can economically reduce the heat load sufficiently to warrant implementation. The least costly option of the tempered water system ($4.4 million) achieves only a 2.4% heat

load reduction, or a heat load reduction cost of $183,000 per Mbtu/hr. The least costly air cooled replacement option ($15 million) achieves a 23.5% heat load reduction or a heat load reduction cost of $63,500 per Mbtu/hr. These quoted costs are estimated capitalized costs inclusive of basic equipment plus the present worth of annual operating costs; actual cost to install would be higher and incorporate related costs such as facility downtime and production losses.

- Construction of cooling towers could significantly reduce heat load and thermal discharges on a long term basis but only at costs ranging from $182,000 to $333,000 per Mbtu/hr. The least costly cooling tower alternative has an estimated total capitalized cost of about $166 million. Estimated to current costs, over $300 million would be required for the least costly alternative.

D. Department Determination

Based on the information described above for toxics and thermal issues, the Department has concluded the following:

- Even if the most expensive cooling tower technology was required, it is unlikely that the permittee could attain the NJNJSWQS for temperature at each of the point sources entering Morses Creek nor could it attain the NJNJSWQS at DSN 001. Factors affecting this thermal issue include the limited size of Morses Creek as well as the fact that the intake water coming from the Arthur Kill is in excess of the NJSWQS criteria under certain conditions.

- The permittee conducted a Section 316(a) study to request a thermal variance from the NJNJSWQS. This study considered the Arthur Kill to be the receiving water and concludes that the discharge from the facility assures the protection and propagation of a balanced indigenous population in the Arthur Kill. While the Department recognizes that Dam No. 1 limits flow from the Arthur Kill into Morses Creek, it is reasonable to conclude that this study could have included an evaluation of Morses Creek. This is based on the 1990 Department decision noted above which stated that Morses Creek is contaminated with oil, which seeps into the creek.

- The Department recognizes that Morses Creek is indeed a stream that shall be protected via the NJNJSWQS. However, the Department would be remiss if it did not recognize that the facility is involved with a large scale clean-up to improve the conditions of the facility including Morses Creek. The Department's Site Remediation Program is requiring significant measures to improve the quality of the receiving stream by reducing the loading of pollutants that enter the creek via groundwater. For example, sludge overlying the bed and groundwater flowing into Morses Creek is contaminated with oil, which seeps into the creek. While some benefits of the site remediation are already making an environmentally beneficial improvement on certain areas of the site, remediation of the stream bed is one of the last areas to be addressed. Therefore, the full benefits of that clean-up will not be realized for at least ten years.

- The toxics characterization showed that detectable quantities of toxics were indeed present at DSNs 003, 004 and/or 005. These quantities may be present due to the fact that they are present in the Arthur Kill intake water as shown in the 1994 toxics characterization. The Department could impose WQBELs for some of these toxics. Because dilution with Morses Creek is minimal, the Department would essentially be applying in-stream criteria at the end-of-pipe which would require significant treatment improvements. However, even if these treatment improvements were implemented and toxics were reduced to non-detectable levels, it would be pointless to require such as these wastestreams would be routed to Morses Creek where they would mingle with existing pollutants from historical sources. Imposing WQBELs based on improper data at this point would not result in protection of Morses Creek since pollutants will continue to find their way to the creek from other historical contamination in areas of the site that are not yet remediated.

- Morses Creek is dammed at both ends thereby limiting access to the balanced indigenous populations. Even if the dams were removed allowing access to aquatic life, it is unlikely that such a population could be supported in Morses Creek given its current degraded conditions.

Given the above, the Department has incorporated the following measures in this NJPDES permit renewal to address toxic and thermal pollutant contributions:

- Retention of comprehensive effluent limitations and monitoring requirements at DSN 001 (Dam 1) and DSN 002 (Wastewater Treatment Plant). This includes retention of the 95 degrees Fahrenheit effluent limitation for temperature as a daily maximum at DSN 001. Also carried forward are the Temperature Difference daily maximum limitation of 15 degrees Celsius and the Net Rate of Addition of Heat instantaneous maximum of 2,300 MBTU/Hr.

- Monitoring requirements for various conventional and toxic pollutants at the significant point sources and ditches that enter Morses Creek specifically DSN 003A, 004A, and 005A. This allows tracking of the thermal and toxic pollutant contributions and is consistent with the finding that Morses Creek is a stream.

9 Description of Cooling Water Intake Structure and Section 316(b) Determination

A. Regulatory Background – Section 316(a) and 316(b) of the Clean Water Act

Section 316(a) of the Federal Clean Water Act regulates the thermal component of surface water discharges. Specifically, Section 316(a) authorizes variances from thermal NJSWQS where it is shown that the alternative limit proposed will "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" in the receiving water. With respect to existing dischargers, 40 CFR 125.73(c) states the following:

(1) Existing discharges may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies. Any such demonstrations shall show:

(i) That no appreciable harm has resulted from the normal component of the discharge taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge has been made; or

(ii) That despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made.

(2) In determining whether or not prior appreciable harm has occurred, the Director shall consider the length of time in which the applicant has been discharging and the nature of the discharge.

Section 316(b) "require[s] that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." The majority of environmental impacts associated with intake structures are caused by water withdrawals that ultimately result in aquatic organism losses. In that regard, cooling water intakes can have two types of effects. The first effect, referred to as *impingement*, occurs when organisms are caught on the intake screens or associated trash racks. Impingement can result in starvation and exhaustion, asphyxiation, and descaling as well as other physical harms. The second effect, referred to as *entrainment*, occurs when organisms pass through the facility's intake screens and the cooling system itself. Organisms that become entrained are normally relatively small benthic, planktonic, and nektonic organisms, including early life stages of fish and shellfish. As entrained organisms pass through a plant's cooling system they are subject to mechanical, thermal, and/or toxic stress.

EPA first promulgated regulations to implement section 316(b) in 1976. The U.S. Court of Appeals for the Fourth Circuit remanded these regulations to EPA which withdrew them, leaving in place a provision that directed permitting authorities to determine best technology available (BTA) for each facility on a case-by-case basis. In 1995, EPA entered into a consent decree establishing a schedule for taking final action on regulations to implement section 316(b).

Under that consent decree, Bayway would have been eligible under the Phase III rule. However, a brief background is provided for all aspects of the rulemaking effort to understand the current requirements.

EPA published a Phase I rule governing **new** facilities in 2001. The U.S. Court of Appeals for the Second Circuit, while generally upholding the rule, rejected the provisions allowing restoration to be used to meet the requirements of the rule. *Riverkeeper, Inc.* v. *U.S. EPA,* 358 F. 3d 174, 181 (2d Cir.2004) ("*Riverkeeper* I").

EPA published a Phase II rule in 2004 that was applicable to **existing power plants with a design intake flow greater than or equal to 50 MGD**. Following challenge, the Second Circuit remanded numerous aspects of the rule to the Agency, including the Agency's decision to reject closed-cycle cooling as BTA. The Agency made this determination, in part, based on a consideration of costs and benefits. The Second Circuit concluded that a comparison of the costs and benefits of closed-cycle cooling was not a proper factor to consider in determining BTA. *Riverkeeper, Inc.* v. *U.S.EPA,* 475 F. 3d 83 (2d Cir. 2007) ("*Riverkeeper* II"). In 2008, the U.S, Supreme Court agreed to review the *Riverkeeper* II decision limited to the single cost-benefit issue. In April 2009, in *Entergy Corp.* v. *Riverkeeper Inc.,* 129 S. Ct. 1498, 68 ERC 1001 (2009) (40 ER 770, 4/3/09), the Supreme Court ruled that it is permissible under section 316(b) to consider costs and benefits in determining the BTA to minimize adverse environmental impacts. The court left it to EPA's discretion to decide whether and how to consider costs and benefits in 316(b) actions, including rulemaking and Best Professional Judgment (BPJ) determinations. The rule was remanded back to EPA for further review.

EPA published the Phase III Rule in 2006. The Phase III rule established 316(b) requirements for **certain new offshore oil and gas extraction facilities.** In addition, EPA determined that, in the case of **electric generators with a design intake flow of less than 50 MGD** and **existing manufacturing facilities**, 316(b) requirements should be established by NPDES permit directors on a case-by-case basis using their BPJ. In July 2010, the U. S. Court of Appeals for the Fifth Circuit issued a decision upholding EPA's rule for new offshore oil and gas extraction facilities. Further, the court granted the request of EPA and environmental petitioners in the case to remand the existing facility portion of the rule back to the Agency for further rulemaking.

In response to the remand in Phase II; the remand of the existing facility portion of the Phase III rule; and the associated Supreme Court decision; EPA proposed a rule in April, 2011. Most significantly, EPA proposed addressing existing power generating facilities and existing manufacturing and industrial facilities in one proceeding. Specifically, the 2011 proposal applies to all existing power generating facilities and existing manufacturing and industrial facilities that have a design intake flow of at least two million gallons from waters of the United States and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. Bayway meets the eligibility criteria of this proposed rule.

While a finalized rule was due out by July 27, 2012, EPA secured an additional year to finalize the rule under a modified settlement agreement with the Riverkeeper. As per the settlement agreement, EPA is working to finalize the standards by June 27, 2013. Until such time as a final rule is issued, states are required to determine BTA for each facility on a case-by-case basis in accordance with BPJ.

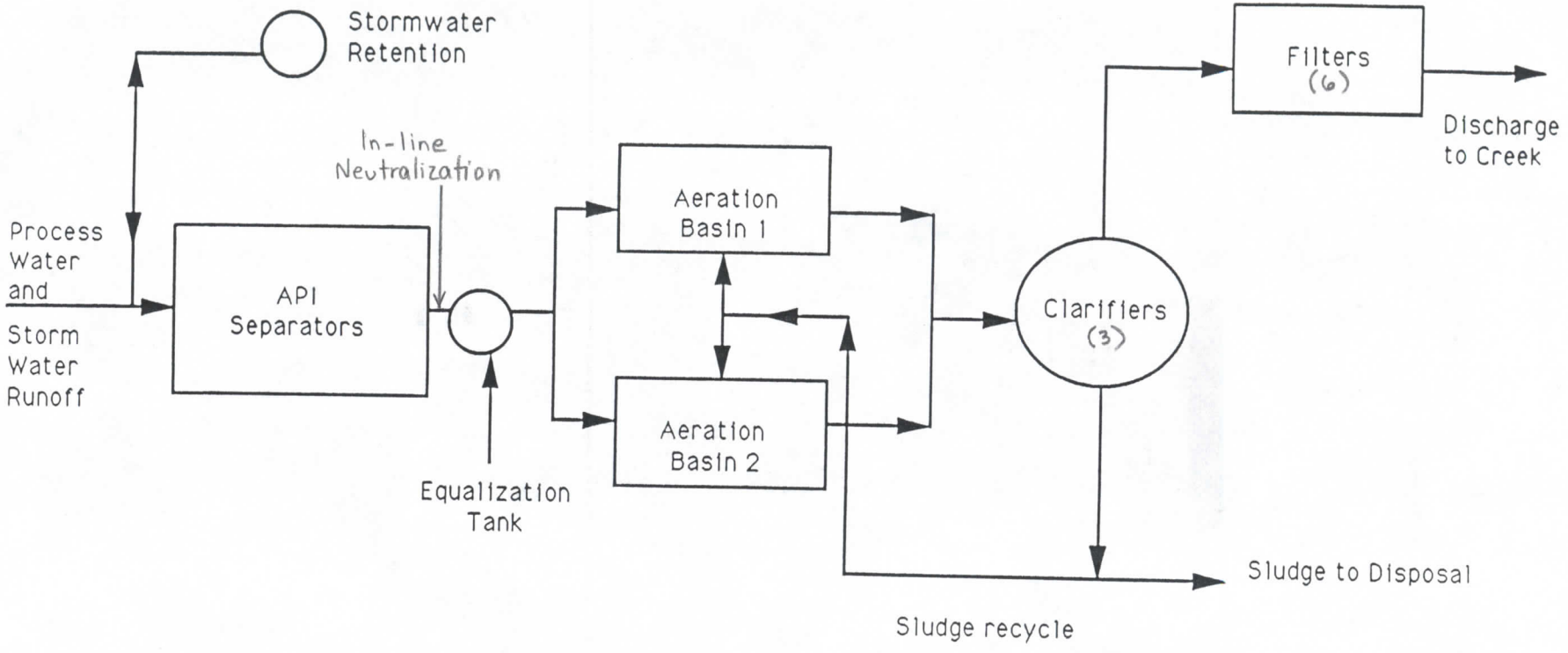
B. Description of Cooling Water Intake Structure

Bayway uses a once-through cooling system. Two shoreline intake structures, designated as the North and South screenhouses are located east of the Bayway property where the North intake structure was built in 1941 and the South intake structure was built during the 1920s. The North and South screenhouses respectively, have four and five intake wells where each well is connected by a 3 foot pipe to a single pump onshore.

Two screenhouses have a total of nine circulators which withdraw water from the Arthur Kill. At the North Screenhouse, cooling water is withdrwawn from the Arthur Kill by one steam-driven 40,000 gallon per minute (gpm) and three synchronized electric 20,000 gpm pumps. The South Screenhouse has a compliment of three synchronized electric, one induction electric and one steam driven pump; each of the five pumps has a 20,000 gpm capacity. All pumps in both screen houses are single-speed pumps.

Att. 3

17 MG



Figure

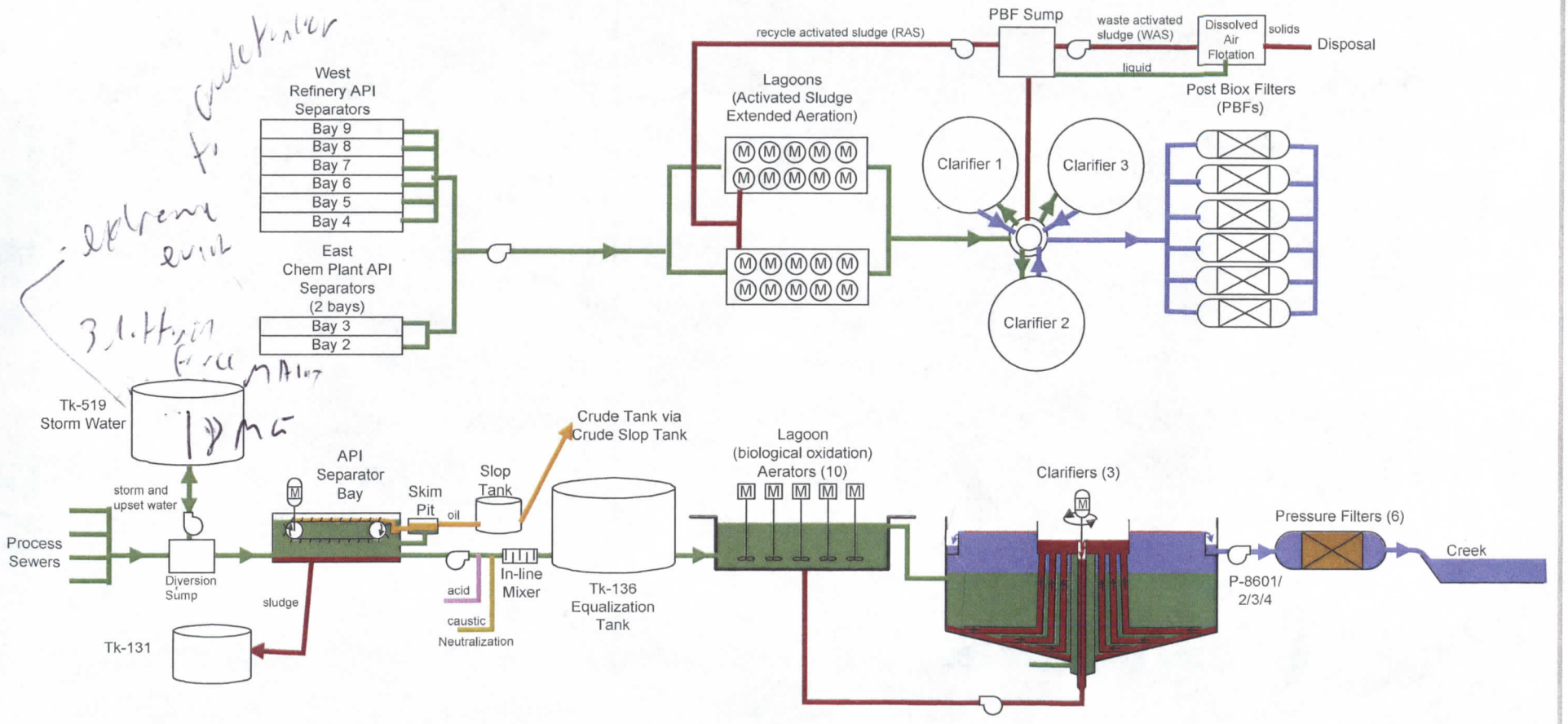
Wastewater Treatment Plant Simplified Flow Diag

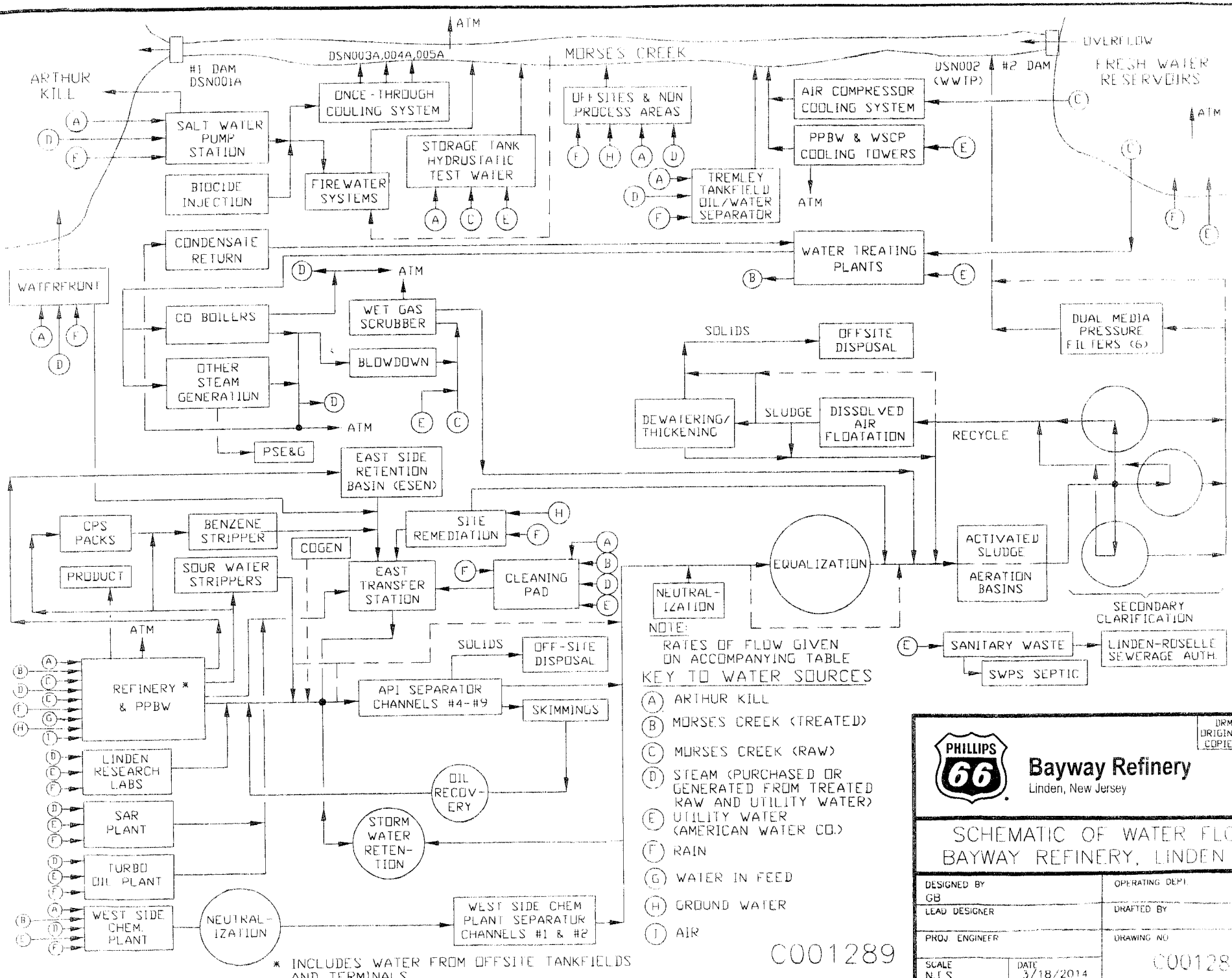
Bayway R

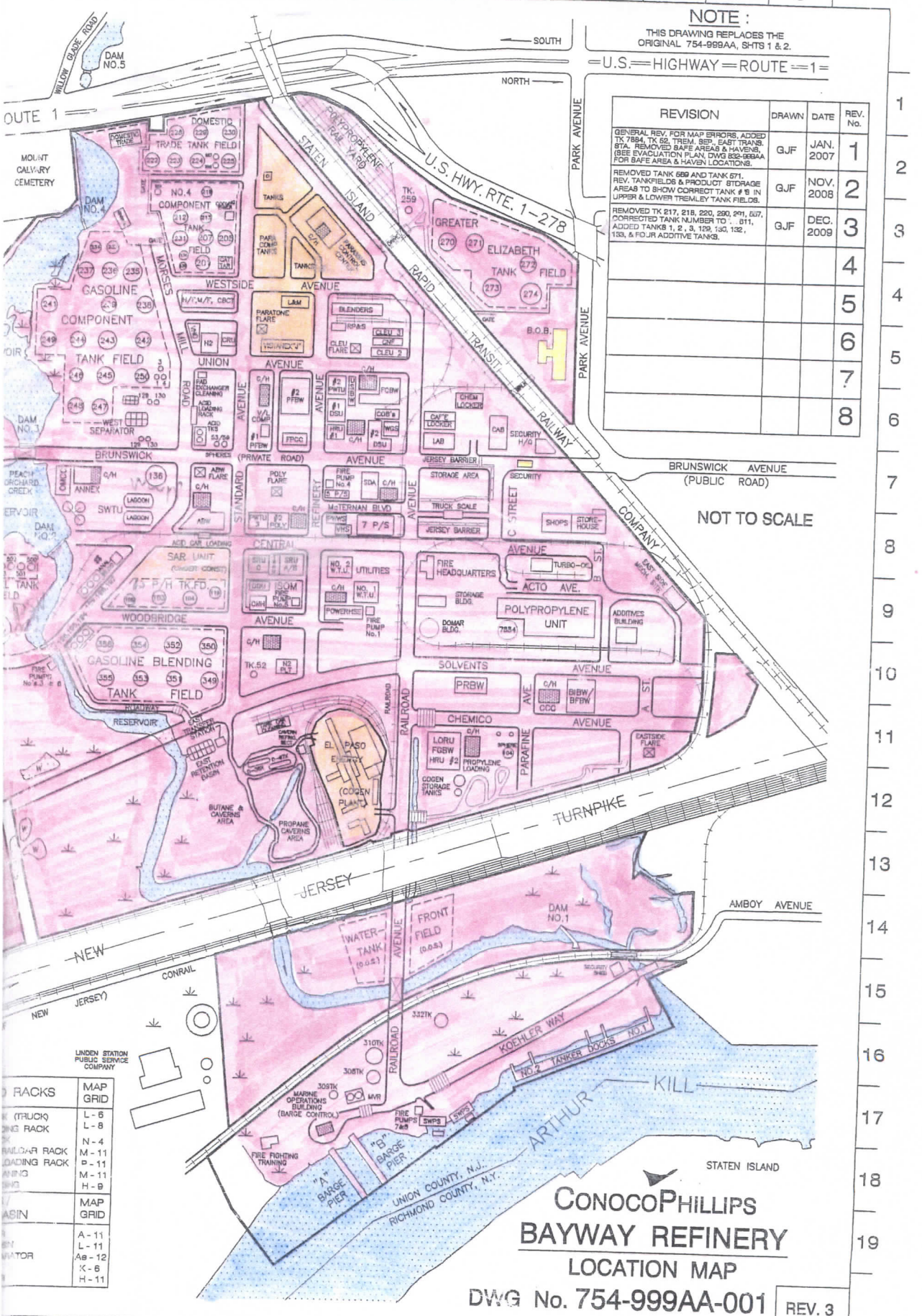
Waste Water Treatment Plant

Functional Process Flow Diagram (FPFD)

Draft A, 5/13/2014




ATM
DSN003A,004A,005A
#1 DAM
DSN001A
MORSES CREEK
OVERFLOW
DSN002
(WWTP)
#2 DAM
FRESH WATER RESERVOIRS
ARTHUR KILL
ONCE-THROUGH COOLING SYSTEM
OFFSITES & NON PROCESS AREAS
AIR COMPRESSOR COOLING SYSTEM
PPBW & WSCP COOLING TOWERS
SALT WATER PUMP STATION
BIOCIDE INJECTION
FIREWATER SYSTEMS
STORAGE TANK HYDRUSTATIC TEST WATER
TREMLEY TANKFIELD OIL/WATER SEPARATOR
CONDENSATE RETURN
WATER TREATING PLANTS
WATERFRONT
CO BOILERS
WET GAS SCRUBBER
BLOWDOWN
OTHER STEAM GENERATION
PSE&G
DUAL MEDIA PRESSURE FILTERS (6)
SOLIDS
OFFSITE DISPOSAL
DEWATERING/ THICKENING
SLUDGE
DISSOLVED AIR FLOATATION
RECYCLE
EAST SIDE RETENTION BASIN (ESEN)
CPS PACKS
PRODUCT
BENZENE STRIPPER
SOUR WATER STRIPPERS
COGEN
SITE REMEDIATION
EAST TRANSFER STATION
CLEANING PAD
NEUTRAL-IZATION
EQUALIZATION
ACTIVATED SLUDGE AERATION BASINS
SECONDARY CLARIFICATION
SANITARY WASTE
LINDEN-ROSELLE SEWERAGE AUTH.
SWPS SEPTIC
REFINERY * & PPBW
LINDEN RESEARCH LABS
SAR PLANT
TURBO OIL PLANT
WEST SIDE CHEM. PLANT
NEUTRAL-IZATION
WEST SIDE CHEM PLANT SEPARATOR CHANNELS #1 & #2
API SEPARATOR CHANNELS #4-#9
OFF-SITE DISPOSAL
SKIMMINGS
OIL RECOV-ERY
STORM WATER RETEN-TION
NOTE:
RATES OF FLOW GIVEN ON ACCOMPANYING TABLE
KEY TO WATER SOURCES
(A) ARTHUR KILL
(B) MORSES CREEK (TREATED)
(C) MORSES CREEK (RAW)
(D) STEAM (PURCHASED OR GENERATED FROM TREATED RAW AND UTILITY WATER)
(E) UTILITY WATER (AMERICAN WATER CO.)
(F) RAIN
(G) WATER IN FEED
(H) GROUND WATER
(I) AIR
* INCLUDES WATER FROM OFFSITE TANKFIELDS AND TERMINALS.
C001289
DRM CODES:
ORIGINAL: EEP100
COPIES: ADM040
PHILLIPS 66
Bayway Refinery
Linden, New Jersey
SCHEMATIC OF WATER FLOW
BAYWAY REFINERY, LINDEN NJ
DESIGNED BY
GB
OPERATING DEPT.
LEAD DESIGNER
DRAFTED BY
PROJ. ENGINEER
DRAWING NO.
C001289
SCALE
N.T.S.
DATE
3/18/2014

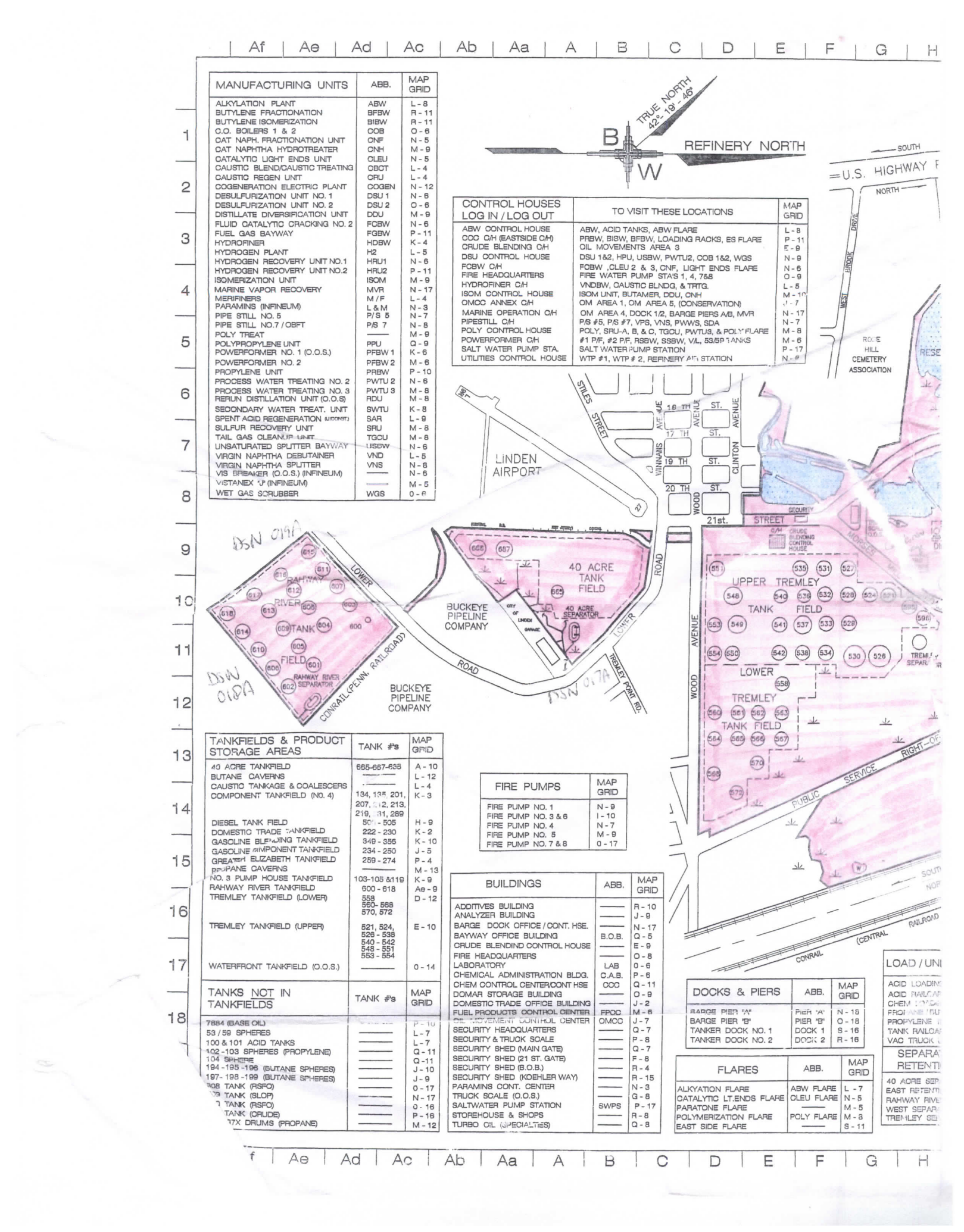


REVISION	DRAWN	DATE	REV. No.
GENERAL REV. FOR MAP ERRORS, ADDED TK 7884, TK 52, TREM. SEP., EAST TRANS. STA. REMOVED BAFE AREAS & HAVENS, (SEE EVACUATION PLAN, DWG 832-998AA FOR BAFE AREA & HAVEN LOCATIONS.	GJF	JAN. 2007	1
REMOVED TANK 569 AND TANK 571. REV. TANKFIELDS & PRODUCT STORAGE AREAS TO SHOW CORRECT TANK # 'S IN UPPER & LOWER TREMLEY TANK FIELDS.	GJF	NOV. 2008	2
REMOVED TK 217, 218, 220, 290, 291, 527, CORRECTED TANK NUMBER TO . 511, ADDED TANKS 1, 2, 3, 129, 130, 132, 133, & FOUR ADDITIVE TANKS.	GJF	DEC. 2009	3
			4
			5
			6
			7
			8

CONOCOPHILLIPS BAYWAY REFINERY

LOCATION MAP

DWG No. 754-999AA-001 REV. 3



MANUFACTURING UNITS	ABB.	MAP GRID
ALKYLATION PLANT	ABW	L - 8
BUTYLENE FRACTIONATION	BFBW	R - 11
BUTYLENE ISOMERIZATION	BIBW	R - 11
C.O. BOILERS 1 & 2	COB	O - 6
CAT NAPH. FRACTIONATION UNIT	CNF	N - 5
CAT NAPHTHA HYDROTREATER	CNH	M - 9
CATALYTIC LIGHT ENDS UNIT	CLEU	N - 5
CAUSTIC BLEND/CAUSTIC TREATING	CBCT	L - 4
CAUSTIC REGEN UNIT	CRU	L - 4
COGENERATION ELECTRIC PLANT	COGEN	N - 12
DESULFURIZATION UNIT NO. 1	DSU 1	N - 6
DESULFURIZATION UNIT NO. 2	DSU 2	O - 6
DISTILLATE DIVERSIFICATION UNIT	DDU	M - 9
FLUID CATALYTIC CRACKING NO. 2	FCBW	N - 6
FUEL GAS BAYWAY	FGBW	P - 11
HYDROFINER	HDBW	K - 4
HYDROGEN PLANT	H2	L - 5
HYDROGEN RECOVERY UNIT NO.1	HRU1	N - 6
HYDROGEN RECOVERY UNIT NO.2	HRU2	P - 11
ISOMERIZATION UNIT	ISOM	M - 9
MARINE VAPOR RECOVERY	MVR	N - 17
MERIFINERS	M / F	L - 4
PARAMINS (INFINEUM)	L & M	N - 3
PIPE STILL NO. 5	P/S 5	N - 7
PIPE STILL NO.7 / OBFT	P/S 7	N - 8
POLY TREAT	——	M - 9
POLYPROPYLENE UNIT	PPU	Q - 9
POWERFORMER NO. 1 (O.O.S.)	PFBW 1	K - 6
POWERFORMER NO. 2	PFBW 2	M - 6
PROPYLENE UNIT	PRBW	P - 10
PROCESS WATER TREATING NO. 2	PWTU 2	N - 6
PROCESS WATER TREATING NO. 3	PWTU 3	M - 8
RERUN DISTILLATION UNIT (O.O.S)	RDU	M - 8
SECONDARY WATER TREAT. UNIT	SWTU	K - 8
SPENT ACID REGENERATION (UNCONST)	SAR	L - 9
SULFUR RECOVERY UNIT	SRU	M - 8
TAIL GAS CLEANUP UNIT	TGCU	M - 8
UNSATURATED SPLITTER BAYWAY	USBW	N - 6
VIRGIN NAPHTHA DEBUTAINER	VND	L - 5
VIRGIN NAPHTHA SPLITTER	VNS	N - 8
VIS BREAKER (O.O.S.) (INFINEUM)	——	N - 6
VISTANEX LP (INFINEUM)	——	M - 5
WET GAS SCRUBBER	WGS	O - 6

CONTROL HOUSES LOG IN / LOG OUT	TO VISIT THESE LOCATIONS	MAP GRID
ABW CONTROL HOUSE	ABW, ACID TANKS, ABW FLARE	L - 8
CCC C/H (EASTSIDE C/H)	PRBW, BISW, BFBW, LOADING RACKS, ES FLARE	P - 11
CRUDE BLENDING C/H	OIL MOVEMENTS AREA 3	E - 9
DSU CONTROL HOUSE	DSU 1&2, HPU, USBW, PWTU2, COB 1&2, WGS	N - 9
FCBW C/H	FCBW ,CLEU 2 & 3, CNF, LIGHT ENDS FLARE	N - 6
FIRE HEADQUARTERS	FIRE WATER PUMP STA'S 1, 4, 7&8	O - 9
HYDROFINER C/H	VNDBW, CAUSTIC BLNDG, & TRTG.	L - 5
ISOM CONTROL HOUSE	ISOM UNIT, BUTAMER, DDU, CNH	M - 10
OMCC ANNEX C/H	OM AREA 1, OM AREA 5, (CONSERVATION)	J - 7
MARINE OPERATION C/H	OM AREA 4, DOCK 1/2, BARGE PIERS A/B, MVR	N - 17
PIPESTILL C/H	P/S #5, P/S #7, VPS, VNS, PWWS, SDA	N - 7
POLY CONTROL HOUSE	POLY, SRU-A, B, & C, TGCU, PWTU3, & POLY FLARE	M - 8
POWERFORMER C/H	#1 P/F, #2 P/F, RSBW, SSBW, V/L, 53/59 TANKS	M - 6
SALT WATER PUMP STA.	SALT WATER PUMP STATION	P - 17
UTILITIES CONTROL HOUSE	WTP #1, WTP # 2, REFINERY AIR STATION	N - 8

TANKFIELDS & PRODUCT STORAGE AREAS	TANK #'s	MAP GRID
40 ACRE TANKFIELD	665-667-668	A - 10
BUTANE CAVERNS	——	L - 12
CAUSTIC TANKAGE & COALESCERS	——	L - 4
COMPONENT TANKFIELD (NO. 4)	134, 135, 201, 207, 212, 213, 219, 231, 289	K - 3
DIESEL TANK FIELD	501 - 505	H - 9
DOMESTIC TRADE TANKFIELD	222 - 230	K - 2
GASOLINE BLENDING TANKFIELD	349 - 356	K - 10
GASOLINE COMPONENT TANKFIELD	234 - 250	J - 5
GREATER ELIZABETH TANKFIELD	259 - 274	P - 4
PROPANE CAVERNS	——	M - 13
NO. 3 PUMP HOUSE TANKFIELD	103-105 &119	K - 9
RAHWAY RIVER TANKFIELD	600 - 618	Ae - 9
TREMLEY TANKFIELD (LOWER)	558, 560- 568, 570, 572	D - 12
TREMLEY TANKFIELD (UPPER)	521, 524, 526 - 538, 540 - 542, 548 - 551, 553 - 554	E - 10
WATERFRONT TANKFIELD (O.O.S.)	——	O - 14

TANKS NOT IN TANKFIELDS	TANK #'s	MAP GRID
7884 (BASE OIL)	——	P - 10
53 / 59 SPHERES	——	L - 7
100 & 101 ACID TANKS	——	L - 7
102 -103 SPHERES (PROPYLENE)	——	Q - 11
104 SPHERE	——	Q -11
194 -195 -196 (BUTANE SPHERES)	——	J - 10
197- 198 -199 (BUTANE SPHERES)	——	J - 9
208 TANK (RSFO)	——	O - 17
209 TANK (SLOP)	——	N - 17
1 TANK (RSFO)	——	O - 16
TANK (CRUDE)	——	P - 16
17X DRUMS (PROPANE)	——	M - 12

FIRE PUMPS	MAP GRID
FIRE PUMP NO. 1	N - 9
FIRE PUMP NO. 3 & 6	I - 10
FIRE PUMP NO. 4	N - 7
FIRE PUMP NO. 5	M - 9
FIRE PUMP NO. 7 & 8	O - 17

BUILDINGS	ABB.	MAP GRID
ADDITIVES BUILDING	——	R - 10
ANALYZER BUILDING	——	J - 9
BARGE DOCK OFFICE / CONT. HSE.	——	N - 17
BAYWAY OFFICE BUILDING	B.O.B.	Q - 5
CRUDE BLENDIND CONTROL HOUSE	——	E - 9
FIRE HEADQUARTERS	——	O - 8
LABORATORY	LAB	O - 6
CHEMICAL ADMINISTRATION BLDG.	C.A.B.	P - 6
CHEM CONTROL CENTER/CONT HSE	CCC	Q - 11
DOMAR STORAGE BUILDING	——	O - 9
DOMESTIC TRADE OFFICE BUILDING	——	J - 2
FUEL PRODUCTS CONTROL CENTER	FPCC	M - 6
OIL MOVEMENT CONTROL CENTER	OMCC	J - 7
SECURITY HEADQUARTERS	——	Q - 7
SECURITY & TRUCK SCALE	——	P - 8
SECURITY SHED (MAIN GATE)	——	Q - 7
SECURITY SHED (21 ST. GATE)	——	F - 8
SECURITY SHED (B.O.B.)	——	R - 4
SECURITY SHED (KOEHLER WAY)	——	R - 15
PARAMINS CONT. CENTER	——	N - 3
TRUCK SCALE (O.O.S.)	——	G - 8
SALTWATER PUMP STATION	SWPS	P - 17
STOREHOUSE & SHOPS	——	R - 8
TURBO OIL (SPECIALTIES)	——	Q - 8

DOCKS & PIERS	ABB.	MAP GRID
BARGE PIER "A"	PIER "A"	N - 16
BARGE PIER "B"	PIER "B"	O - 18
TANKER DOCK NO. 1	DOCK 1	S - 16
TANKER DOCK NO. 2	DOCK 2	R - 16

FLARES	ABB.	MAP GRID
ALKYATION FLARE	ABW FLARE	L - 7
CATALYTIC LT.ENDS FLARE	CLEU FLARE	N - 5
PARATONE FLARE	——	M - 5
POLYMERIZATION FLARE	POLY FLARE	M - 8
EAST SIDE FLARE	——	S - 11

LOAD / UNI
ACID LOADING
ACID RAILCAR
CHEM LOADI
PROPANE / BU
PROPYLENE L
TANK RAILCAR
VAC TRUCK L
SEPARA
RETENTI
40 ACRE SEP
EAST RETENTI
RAHWAY RIVE
WEST SEPARA
TREMLEY SEP

HH.4

Phillips 66
Bayway Refinery
P.O. Box 222
1400 Park Avenue
Linden, New Jersey 07036

CERTIFIED MAIL - RRR
7011 2970 0002 8129 7822

December 23, 2014

Impingement Alternatives Analysis Assessment
NJPDES Permit NJ0001511

New Jersey Department of Environmental Protection
Mail Code 401-02B
Division of Water Quality
Bureau of Surface Water Permitting
401 East State Street
P.O. Box 420
Trenton, NJ 08625-0420
Attn: Susan Rosenwinkel

Dear Ms. Rosenwinkel:

In accordance with Part IV, Section G. of permit NJPDES Permit NJ0001511, Phillips 66 is enclosing the Impingement Alternatives Analysis study assessing technologies to reduce impingement mortality at the Bayway Refinery Salt Water Pump Station cooling water intakes.

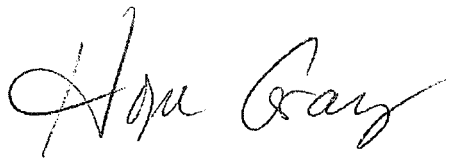
The enclosed study was performed in three phases. In Phase 1, a preliminary evaluation of a broad spectrum of alternatives was conducted that identified four options for further study. In Phase 2, the four options were evaluated in more detail for biological efficacy, engineering feasibility, constructability, and comparative costs. In Phase 3, scoping cost estimates and implementation schedules were developed taking into account site-specific conditions for the most viable technological options. Besides a de minimis, no upgrade alternative, the final technological options evaluated were: 1) replacement of existing traveling screens with modified Ristroph traveling screens and a fish return system, as specified in Section G. of the permit; and 2) a static barrier screen installed externally around each of the two intake structures at the Salt Water Pump Station. Appendices E and F contain the design, cost estimate, and implementation schedule for the modified Ristroph screen and barrier screen options, respectively.

The study found that other than a de minimis, no upgrade option, the most cost-effective option to meet Best Technology Available for impingement mortality reduction at the Salt Water Pump Station was the installation of static barrier screens.

We are available to meet and discuss the study at your convenience. Please feel free to contact George Bakun at 908-523-5896 or George.Bakun@p66.com with any questions, comments or possible meeting times.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information.



Hope Gray
HSE Manager

cc: Robert Hall
New Jersey Department of Environmental Protection
Bureau of Surface Water Permitting
Mail Code 401-02B
P.O. Box 0420
Trenton, New Jersey 08625-0420

Phillips 66 Bayway Refinery

Impingement Alternatives Analysis

December 2014

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Best Technology Available **Error! Bookmark not defined.**

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screens alternative did not meet the 0.5 fps through screen design velocity, it was not considered a viable option warranting further evaluation.

PHASE 3 EVALUATION

Under Phase 3, the though-flow modified Ristroph screens with fish return and the barrier screen technologies were further engineered and then cost estimated. Appendix E provides sketches, diagrams, and equipment information for the modified Ristroph screens. Appendix F provides sketches, diagrams, and equipment information for the barrier screens.

PHASE 3 EVALUATION SUMMARY AND RECOMMENDATION

The modified-Ristroph through-flow traveling screen with fish return system is estimated to cost $13.5 MM in 4Q 2014 dollars. The major scope items include:

- Replacement of the existing traveling screens with new modified-Ristroph traveling screens inside the existing nine intake wells
- Expansion of each intake structure deck with a new building to protect the new equipment
- New pile supported troughs to return fish to the Arthur Kill
- Replacement of the spray wash water system with separate fish and debris troughs
- Rebuilding the biocide system
- Four, new spray wash water pumps
- Electrical distribution additions for new loads from the spray water pumps.

To execute such a project, the estimated duration is a minimum of 26 months from a decision to proceed to project completion. This duration is conditional on the project schedule aligning with conducting the piling work outside of the February 1 to June 30 fish migration period to avoid schedule disruptions.

The modified-Ristroph screens are expected to increase the refinery's maintenance expense by $100,000 to $200,000 per year. This occurs because four new and larger pumps are installed and the new traveling screens will operate continuously instead of the intermittent operation of the existing traveling screens.

The percent mortality for modified-Ristroph through flow screens varied from as low as 2.8 percent for naked goby to 87.7 percent for bay anchovy. The average percent

mortality across all RIS and assumed overall percent mortality for modified-Ristroph through flow screens is estimated to be 26.4 percent. These estimates include anticipated efficacy of fragile species.

Applying the efficacy values to the impingement quantities collected at Bayway, which were adjusted by using weighted averages based on the relative abundance of the species of interest, the use of modified-Ristroph through flow screens estimates an overall 91.9 percent reduction with the original impingement quantities and 91.8 percent reduction with the adjusted impingement quantities, including fragile species.

The Barrier Screen system is estimated to cost $ 5.3 MM in 4Q 2014 dollars. The major scope items include:

- Installation of 44 "H" piles to support the new screen panels
- Fabrication and installation of 39 panels between the "H" piles, with each screen panel comprised of 3/8" stainless steel wedgewire mesh.
- Installation of wood timber piling dolphins to protect the screen panel system around each intake structure.

To execute such a project, the estimated duration is a minimum of 25 months from a decision to proceed to project completion. This duration is conditional on the project schedule aligning with conducting the piling and dredging work outside of the February 1 to June 30 fish migration period to avoid schedule disruptions.

The barrier screens are expected to increase the refinery's maintenance expense by $400,000 per year. This occurs because the screens are expected to foul with biological growth and will require frequent in-situ mechanical cleaning by diver teams.

Bayway is not aware of any facility that currently employs a barrier screen system comparable to what is considered for Bayway. As a conservative assumption, the biological efficacy data for the barrier nets deployed at Chalk Point (Bailey 2005) were used to estimate how well the barrier screen system may work. In general, the expected efficacy numbers for the proposed barrier screen system for Bayway is expected to be lower than barrier nets.

The percent mortality for a barrier net configuration varied as low as 2 percent in Atlantic tomcod to 40.5 percent for bay anchovy and naked goby. The average percent mortality across all RIS and estimated overall percent mortality for a barrier screen system is estimated to be less than 22.5 percent.

Applying the efficacy values to the impingement quantities collected at Bayway, which were adjusted by using weighted averages based on the relative abundance of the species of interest, the use of barrier screens estimates an overall 81.6 percent reduction with the original impingement quantities and 81.7 percent reduction with the adjusted impingement quantities, including fragile species

The key parameters of each option are compared below:

	Modified-Ristroph Traveling Screens	Barrier Screens
Average % Mortality Across All RIS	26.4%	<22.5%
Estimated % Impingement Reduction	91.9%	81.6%
Project Cost	$13.5 MM	$5.3 MM
Minimum Project Schedule Duration	26 months	25 months
Estimated Annual Operating & Maintenance Expense (additional to existing screen operation)	+$100,000 to $200,000 per year	+$400,000 per year

After conducting a thorough review of available technologies, other than a de minimis, no upgrade option, the most cost-effective Impingement Mortality Reduction Best Technology Available was determined to be barrier screens.

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Attachment 5 – Tremley Separator Inspection Log from June 11, 12, 13, 2019 provided by Bayway Refinery following the inspection. No problems were identified by Refinery operators.

Is the Vac Truck Pad Drain Valve open?	Yes			
Is oil accumulated in the outlet box?	No		Robinson, Kenneth W	6/10/2019 10:57:31
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Robinson, Kenneth W	6/10/2019 10:57:31
Is the Vac Truck Pad Drain Valve open?	No		Robinson, Kenneth W	6/10/2019 10:57:31
Is oil accumulated in the outlet box?	No		French, Patrick R	6/10/2019 23:21:09
Any cracks or breaches in Vac Truck Pad or Toewall?	No		French, Patrick R	6/10/2019 23:21:09
Is the Vac Truck Pad Drain Valve open?	No		French, Patrick R	6/10/2019 23:21:10
Is oil accumulated in the outlet box?	No		Robinson, Kenneth W	6/11/2019 10:58:11
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Robinson, Kenneth W	6/11/2019 10:58:12
Is the Vac Truck Pad Drain Valve open?	No		Robinson, Kenneth W	6/11/2019 10:58:12
Is oil accumulated in the outlet box?	No		French, Patrick R	6/11/2019 20:38:48
Any cracks or breaches in Vac Truck Pad or Toewall?	No		French, Patrick R	6/11/2019 20:38:48
Is the Vac Truck Pad Drain Valve open?	No		French, Patrick R	6/11/2019 20:38:48
Is oil accumulated in the outlet box?	No		Phillips, Mary Grace	6/12/2019 07:35:05
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Phillips, Mary Grace	6/12/2019 07:35:05
Is the Vac Truck Pad Drain Valve open?	No		Phillips, Mary Grace	6/12/2019 07:35:05
Is oil accumulated in the outlet box?	No		Woody, Shinard	6/13/2019 00:24:03
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Woody, Shinard	6/13/2019 00:24:04
Is the Vac Truck Pad Drain Valve open?	No		Woody, Shinard	6/13/2019 00:24:04
Is oil accumulated in the outlet box?	No		Phillips, Mary Grace	6/13/2019 10:43:56
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Phillips, Mary Grace	6/13/2019 10:43:57
Is the Vac Truck Pad Drain Valve open?	No		Phillips, Mary Grace	6/13/2019 10:43:57
Is oil accumulated in the outlet box?	No		Woody, Shinard	6/13/2019 23:22:13
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Woody, Shinard	6/13/2019 23:22:14
Is the Vac Truck Pad Drain Valve open?	No		Woody, Shinard	6/13/2019 23:22:15
Is oil accumulated in the outlet box?	No		French, Patrick R	6/14/2019 08:52:14
Any cracks or breaches in Vac Truck Pad or Toewall?	No		French, Patrick R	6/14/2019 08:52:15
Is the Vac Truck Pad Drain Valve open?	No		French, Patrick R	6/14/2019 08:52:15
Is oil accumulated in the outlet box?	No		Phillips, Mary Grace	6/14/2019 21:52:46
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Phillips, Mary Grace	6/14/2019 21:52:47
Is the Vac Truck Pad Drain Valve open?	No		Phillips, Mary Grace	6/14/2019 21:52:48
Is oil accumulated in the outlet box?	No		French, Patrick R	6/15/2019 09:13:55
Any cracks or breaches in Vac Truck Pad or Toewall?	No		French, Patrick R	6/15/2019 09:13:55
Is the Vac Truck Pad Drain Valve open?	No		French, Patrick R	6/15/2019 09:13:56
Is oil accumulated in the outlet box?	No		Phillips, Mary Grace	6/15/2019 17:06:48
Is the Vac Truck Pad Drain Valve open?	No		Phillips, Mary Grace	6/15/2019 17:06:49
Any cracks or breaches in Vac Truck Pad or Toewall?	No		Phillips, Mary Grace	6/15/2019 17:06:49